Enterasys Matrix™ DFE-Gold Series

Configuration Guide

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About This Guide

Welcome to the Enterasys Networks *Matrix DFE-Gold Series Configuration Guide*. This manual explains how to access the device's Command Line Interface (CLI) and how to use it to configure Matrix DFE-Gold Series switch/router devices.

Important Notice

Depending on the firmware version used in your Matrix Series device, some features described in this document may not be supported. Refer to the Release Notes shipped with your Matrix Series device to determine which features are supported.

USING THIS GUIDE

A general working knowledge of basic network operations and an understanding of CLI management applications is helpful before configuring the Matrix Series device.

This manual describes how to do the following:

- Access the Matrix Series CLI.
- Use CLI commands to perform network management and device configuration operations
- Establish and manage Virtual Local Area Networks (VLANs).
- Manage static and dynamically-assigned user policies.
- Establish and manage priority classification.
- Configure IP routing and routing protocols, including RIP versions 1 and 2, OSPF,DVMRP, IRDP and VRRP
- Configure security protocols, including 802.1X and RADIUS, SSHv2, MAC locking, MAC authentication, multiple authentication, DoS attack prevention, and flow setup throttling.
- Configure policy-based routing
- Configure access control lists (ACLs)

STRUCTURE OF THIS GUIDE

The guide is organized as follows:

Chapter 1, **Introduction**, provides an overview of the tasks that can be accomplished using the CLI interface, an overview of local management requirements, and information about obtaining technical support.

Chapter 2, **Startup and General Configuration**, provides an overview of the device's factory default settings and describes how to start the CLI interface, how to set basic system properties, how to download a firmware image, how to configure WebView and Telnet, how to manage configuration files, how to set the login password, how to exit the CLI, and how to prepare the device for router mode operation.

Chapter 3, **Port Configuration**, describes how to review and configure console port settings, and how to enable or disable switch ports and configure switch port settings, including port speed, duplex mode, auto-negotiation, flow control, port mirroring, link aggegation and broadcast suppression.

Chapter 4, **SNMP Configuration**, describes how to configure SNMP users and user groups, access rights, target addresses, and notification parameters.

Chapter 5, **Spanning Tree Configuration**, describes how to review and set Spanning Tree bridge parameters for the device, including bridge priority, hello time, maximum aging time and forward delay; and how to review and set Spanning Tree port parameters, including port priority and path costs.

Chapter 6, **802.1Q VLAN Configuration**, describes how to create static VLANs, select the mode of operation for each port, establish VLAN forwarding (egress) lists, route frames according to VLAN ID, display the current ports and port types associated with a VLAN and protocol, create a secure management VLAN, and configure ports on the device as GVRP-aware ports.

Chapter 7, **Policy Classification Configuration**, describes how to create, change or remove user roles or profiles based on business-specific use of network services; how to permit or deny access to specific services by creating and assigning classification rules which map user profiles to frame filtering policies; how to classify frames to a VLAN or Class of Service (CoS); and how to assign or unassign ports to policy profiles so that only ports activated for a profile will be allowed to transmit frames accordingly.

Chapter 8, **Port Priority and Rate Limiting Configuration**, describes how to set the transmit priority of each port, display the current traffic class mapping-to-priority of each port, set ports to either transmit frames according to selected priority transmit queues or percentage of port transmission capacity for each queue, and configure a rate limit for a given port and list of priorities.

Chapter 9, **IGMP Configuration**, describes how to configure Internet Group Management Protocol (IGMP) settings for multicast filtering, including IGMP query count, IGMP report delay and IGMP group status.

Chapter 10, **Logging and Network Management**, describes how to configure Syslog, how to manage general switch settings, how to monitor network events and status while the device is in switch mode, including the eventlog, command history, netstats and RMON statistics, how to manage network addresses and routes, and how to configure SNTP and node aliases.

Chapter 11, **IP Configuration**, describes how to enable IP routing for router mode operation, how to configure IP interface settings, how to review and configure the routing ARP table, how to review and configure routing broadcasts, how to configure PIM, how to configure LSNAT and DHCP server, and how to configure IP routes.

Chapter 12, **Routing Protocol Configuration**, describes how to configure RIP, OSPF, DVMRP, IRDP and VRRP.

Chapter 13, **Security Configuration**, describes how to configure 802.1X authentication using EAPOL, how to configure RADIUS server, TACACS +, RFC3580, Secure Shell server, MAC authentication, MAC locking, Port Web Authentication, multiple authentication, policy-based routing, and IP access control lists (ACLs), Denial of Service (DoS) prevention, and flow setup throttling.

RELATED DOCUMENTS

The following Enterasys Networks documents may help you to set up, control, and manage the Matrix Series device:

- *Ethernet Technology Guide*
- *Cabling Guide*
- *Matrix Series Installation Guide(s)*
- *Matrix WebView User's Guide*

Documents listed above, can be obtained from the World Wide Web in Adobe Acrobat Portable Document Format (PDF) at the following web site:

http://www.enterasys.com/support/manuals/

DOCUMENT CONVENTIONS

This guide uses the following conventions:

bold type	Bold type indicates required user input, including command keywords, that must be entered as shown for the command to execute.
italic type	When used in general text, italic type indicates complete document titles. When used in CLI command syntax, italic type indicates a user-supplied parameter, either required or optional, to be entered after the command keyword(s).
n.nn	A period in numerals signals the decimal point indicator (e.g., 1.75 equals one and three fourths). Or, periods used in numerals signal the decimal point in Dotted Decimal Notation (DDN) (e.g., 000.000.000.000 in an IP address).
x	A lowercase italic *x* indicates the generic use of a letter (e.g., *xxx* indicates any combination of three alphabetic characters).
n	A lowercase italic *n* indicates the generic use of a number (e.g., 19*nn* indicates a four-digit number in which the last two digits are unknown).
[ ]	Square brackets indicate optional parameters.
{ }	Braces indicate required parameters. One or more parameters must be entered.
{[ ]}	Square brackets nested within braces indicate one or more optional parameters must be chosen.
|	A bar indicates a choice in parameters.

The following icons are used in this guide:

NOTE: Calls the reader's attention to any item of information that may be of special importance.

ROUTER: This symbol denotes **router-only** functions. Features, commands and information in this guide not differentiated by this symbol refer to switch-mode operation.

CAUTION: Warns the reader about actions that could affect network operation.

1

Introduction

This chapter provides an overview of the Matrix Series' unique features and functionality, an overview of the tasks that may be accomplished using the CLI interface, an overview of ways to manage the device, and information on how to contact Enterasys Networks for technical support.

Important Notice

Depending on the Matrix Series firmware version you are using, some features described in this document may not be supported. Refer to the Release Notes shipped with the your device to determine which features are supported.

1.1 MATRIX DFE SERIES FEATURES

Matrix Series devices support business-driven networking with:

- New Enterasys advanced Distributed Forwarding Engine (DFE) architecture allowing for single IP address management of an entire chassis.
- High availability design featuring fully redundant, hot-swappable modules, power supplies and fans.
- Advanced QoS and policy-based frame classification, and bandwidth management featuring rate limiting, CoS priority queueing and link aggregation.
- Customized, single-source management and control with SNMP, port mirroring, Syslog, RMON, multi-image support and configuration upload/download.

1.2 MATRIX SERIES CLI OVERVIEW

Enterasys Networks' Matrix Series CLI interface allows you to perform a variety of network management tasks, including the following:

- Assign IP address and subnet mask.
- Select a default gateway.
- Assign a login password to the device for additional security.
- Download a new firmware image.
- Designate which network management workstations receive SNMP traps from the device.
- View device, interface, and RMON statistics.
- Manage configuration files.
- Assign ports to operate in the standard or full duplex mode.
- Control the number of received broadcasts that are switched to the other interfaces.
- Set flow control on a port-by-port basis.
- Set port configurations and port-based VLANs.
- Configure ports to prioritize and assign a VLAN or Class of Service to incoming frames based on Layer 2, Layer 3, and Layer 4 information.
- Configure the device to operate as a Generic Attribute Registration Protocol (GARP) device to dynamically create VLANs across a switched network.
- Redirect frames according to a port or VLAN and transmit them on a preselected destination port.
- Configure Spanning Trees.
- Clear NVRAM.
- Configure interfaces for IP routing.
- Configure RIP, OSPF, DVMRP, IRDP and VRRP routing protocols.
- Configure security methods, including 802.1X. RADIUS, TACACS, CEP, SSHv2, MAC locking, and DoS attack prevention.
- Configure access lists (ACLs).

1.3 DEVICE MANAGEMENT METHODS

The Matrix Series device can be managed using the following methods:

- Locally using a VT type terminal connected to the console port.
- Remotely using a VT type terminal connected through a modem.
- Remotely using an SNMP management station.
- In-band through a Telnet connection.
- In-band using Enterasys Networks' NetSight® management application.
- Remotely using WebView™, Enterasys Networks' embedded web server application.

The *Matrix Series Installation Guide* provides setup instructions for connecting a terminal or modem to the Matrix Series device.

1.4 GETTING HELP

For additional support related to this device or document, contact Enterasys Networks using one of the following methods:

World Wide Web	www.enterasys.com/services/support/
Phone	1-800-872-8440 (toll-free in U.S. and Canada) or 1-978-684-1000 For the Enterasys Networks Support toll-free number in your country: www.enterasys.com/services/support/contact/
Internet mail	support@enterasys.com To expedite your message, type **[N-Series]** in the subject line.
To send comments concerning this document to the Technical Publications Department: techpubs@enterasys.com Please include the document Part Number in your email message.	

Before calling Enterasys Networks, have the following information ready:

- Your Enterasys Networks service contract number
- A description of the failure
- A description of any action(s) already taken to resolve the problem (e.g., changing mode switches, rebooting the unit, etc.)
- The serial and revision numbers of all involved Enterasys Networks products in the network
- A description of your network environment (layout, cable type, etc.)
- Network load and frame size at the time of trouble (if known)
- The device history (i.e., have you returned the device before, is this a recurring problem, etc.)
- Any previous Return Material Authorization (RMA) numbers

2

Startup and General Configuration

This chapter describes factory default settings and the Startup and General Configuration set of commands.

2.1 STARTUP AND GENERAL CONFIGURATION SUMMARY

At startup, the Matrix Series device is configured with many defaults and standard features. The following sections provide information on how to review and change factory defaults, how to customize basic system settings to adapt to your work environment, and how to prepare to run the device in router mode.

2.1.1 Factory Default Settings

The following tables list factory default device settings available on the Matrix Series device. Table 2-1 lists default settings for Matrix Series switch operation. Table 2-2 lists default settings for router mode operation.

Table 2-1 Default Device Settings for Basic Switch Operation

Device Feature	Default Setting
CDP discovery protocol	Auto enabled on all ports.
CDP authentication code	Set to **00-00-00-00-00-00-00-00**
CDP hold time	Set to **180** seconds.
CDP interval	Transmit frequency of CDP messages set to **60** seconds.
Cisco Discovery Protocol	Globally auto-enabled, enabled on ports.

Table 2-1 Default Device Settings for Basic Switch Operation (Continued)

Device Feature	Default Setting
Community name	Public.
Convergence End Points phone detection	Disabled globally and on all ports
EAPOL	Disabled.
EAPOL authentication mode	When enabled, set to **auto** for all ports.
GARP timer	Join timer set to **20** centiseconds; leave timer set to **60** centiseconds; leaveall timer set to **1000** centiseconds.
GVRP	Globally enabled.
IGMP	Disabled. When enabled, query interval is set to **125**seconds and response time is set to **100** tenths of a second.
IP mask and gateway	Subnet mask set to **255.0.0.0**; default gateway set to **0.0.0.0**
IP routes	No static routes configured.
Jumbo frame support	Disabled on all ports.
Link aggregation admin key	Set to 32768 for all ports.
Link aggregation flow regeneration	Disabled.
Link aggregation system priority	Set to 32768 for all ports.
Link aggregation outport algorithm	Set to DIP-SIP.
Lockout	Set to disable Read-Write and Read-Only users, and to lockout the default admin (Super User) account for 15 minutes, after 3 failed login attempts,
Logging	Syslog port set to UDP port number **514**. Logging severity level set to **6** (significant conditions) for all applications.

Table 2-1 Default Device Settings for Basic Switch Operation (Continued)

Device Feature	Default Setting
MAC aging time	Set to 300 seconds.
MAC locking	Disabled (globally and on all ports).
Management Authentication Notification	Enabled
MTU discovery protocol	Enabled.
Passwords	Set to an empty string for all default user accounts. User must press ENTER at the password prompt to access CLI.
Password aging	Disabled.
Password history	No passwords are checked for duplication.
Policy classification	Classification rules are automatically enabled when created.
Port auto-negotiation	Enabled on all ports.
Port advertised ability	Maximum ability advertised on all ports.
Port broadcast suppression	Disabled (no broadcast limit).
Port duplex mode	Set to **half** duplex, except for 100BASE-FX and 1000BASE-X, which is set to **full** duplex.
Port enable/disable	Enabled.
Port priority	Set to **1**.
Port speed	Set to **10** Mbps, except for 1000BASE-X, which is set to **1000** Mbps, and **100**BASE-FX, which is set to 100 Mbps.
Port trap	All ports are enabled to send link traps.
Priority classification	Classification rules are automatically enabled when created.
RADIUS client	Disabled.

Table 2-1 Default Device Settings for Basic Switch Operation (Continued)

Device Feature	Default Setting
RADIUS last resort action	When the client is enabled, set to **Challenge**.
RADIUS retries	When the client is enabled, set to **3**.
RADIUS timeout	When the client is enabled, set to **20** seconds.
Rate limiting	Disabled (globally and on all ports).
SNMP	Enabled.
SNTP	Disabled.
Spanning Tree	Globally enabled and enabled on all ports.
Spanning Tree edge port administrative status	Enabled.
Spanning Tree edge port delay	Enabled.
Spanning Tree forward delay	Set to **15** seconds.
Spanning Tree hello interval	Set to **2** seconds.
Spanning Tree ID (SID)	Set to **0**.
Spanning Tree legacy path cost	Disabled.
Spanning Tree maximum aging time	Set to **20** seconds.
Spanning Tree point-to-point	Set to **auto** for all Spanning Tree ports.
Spanning Tree port priority	All ports with bridge priority are set to **128** (medium priority).

Table 2-1 Default Device Settings for Basic Switch Operation (Continued)

Device Feature	Default Setting
Spanning Tree priority	Bridge priority is set to **32768**.
Spanning Tree topology change trap suppression	Enabled.
Spanning Tree transmit hold count	Set to **3**.
Spanning Tree version	Set to **mstp** (Multiple Spanning Tree Protocol).
SSH	Disabled.
System baud rate	Set to **9600** baud.
System contact	Set to empty string.
System location	Set to empty string.
System name	Set to empty string.
Terminal	CLI display set to **80** columns and **24** rows.
Timeout	Set to **15** minutes.
User names	Login accounts set to **ro** for Read-Only access; **rw** for Read-Write access; and **admin** for Super User access.
VLAN dynamic egress	Disabled on all VLANs.
VLAN ID	All ports use a VLAN identifier of **1**.
WebView (HTTP)	Enabled on TCP port 80.

Table 2-2 Default Device Settings for Router Mode Operation

Device Feature	Default Setting
Access groups (IP security)	None configured.
Access lists (IP security)	None configured.
Area authentication (OSPF)	Disabled.
Area default cost (OSPF)	Set to **1**.
Area NSSA (OSPF)	None configured.
Area range (OSPF)	None configured.
ARP table	No permanent entries configured.
ARP timeout	Set to **14,400** seconds.
Authentication key (RIP and OSPF)	None configured.
Authentication mode (RIP and OSPF)	None configured.
Dead interval (OSPF)	Set to **40** seconds.
Disable triggered updates (RIP)	Triggered updates allowed.
Distribute list (RIP)	No filters applied.
DoS prevention	Disabled.
DVMRP	Disabled. Metric set to **1**.
Hello interval (OSPF)	Set to **10** seconds for broadcast and point-to-point networks. Set to **30** seconds for non-broadcast and point-to-multipoint networks.
ICMP	Enabled for echo-reply and mask-reply modes.

Table 2-2 Default Device Settings for Router Mode Operation (Continued)

Device Feature	Default Setting
IP-directed broadcasts	Disabled.
IP forward-protocol	Enabled with no port specified.
IP interfaces	Disabled with no IP addresses specified.
IRDP	Disabled on all interfaces. When enabled, maximum advertisement interval is set to **600** seconds, minimum advertisement interval is set to **450** seconds, holdtime is set to **1800** seconds, and address preference is set to **0**.
MD5 authentication (OSPF)	Disabled with no password set.
MTU size	Set to **1500** bytes on all interfaces.
OSPF	Disabled.
OSPF cost	Set to **10** for all interfaces.
OSPF network	None configured.
OSPF priority	Set to **1**.
Passive interfaces (RIP)	None configured.
Proxy ARP	Enabled on all interfaces.
Receive interfaces (RIP)	Enabled on all interfaces.
Retransmit delay (OSPF)	Set to **1** second.
Retransmit interval (OSPF)	Set to **5** seconds.
RIP receive version	Set to accept both version **1** and version **2**.
RIP send version	Set to version **1**.

Table 2-2 Default Device Settings for Router Mode Operation (Continued)

Device Feature	Default Setting
RIP offset	No value applied.
SNMP	Enabled.
Split horizon	Enabled for RIP packets without poison reverse.
Stub area (OSPF)	None configured.
Telnet	Enabled.
Telnet port (IP)	Set to port number **23**.
Timers (OSPF)	SPF delay set to **5** seconds. SPF holdtime set to **10** seconds.
Transmit delay (OSPF)	Set to **1** second.
VRRP	Disabled.

2.1.2 CLI "Command Defaults" Descriptions

Each command description in this guide includes a section entitled "Command Defaults" which contains different information than the factory default settings on the device as described in Table 2-1 and Table 2-2. The command defaults section defines CLI behavior if the user enters a command without typing optional parameters (indicated by square brackets [ ]). For commands without optional parameters, the defaults section lists "None". For commands with optional parameters, this section describes how the CLI responds if the user opts to enter only the keywords of the command syntax. Figure 2-1 provides an example.

Figure 2-1 Sample CLI Default Description

show port status [*port-string*]

Command Defaults
If *port-string* is not specified, status information for all ports will be displayed.

2.1.3 CLI Command Modes

Each command description in this guide includes a section entitled "Command Mode" which states whether the command is executable in Admin (Super User), Read-Write or Read-Only mode. Users with Read-Only access will only be permitted to view Read-Only (**show**) commands. Users with

Read-Write access will be able to modify all modifiable parameters in **set** and **show** commands, as well as view Read-Only commands. Administrators or Super Users will be allowed all Read-Write and Read-Only privileges, and will be able to modify local user accounts. The Matrix Series device indicates which mode a user is logged in as by displaying one of the following prompts:

- Admin: `Matrix(su)->`
- Read-Write: `Matrix(rw)->`
- Read-Only: `Matrix(ro)->`

NOTE: Depending on which Matrix Series device you are using, your default command prompt may be different than the examples shown.

2.1.4 Using WebView

By default WebView (Enterasys Networks' embedded web server for device configuration and management tasks) is enabled on TCP port number 80 of the Matrix Series device. You can verify WebView status, enable or disable WebView, as described in the following section.

Displaying WebView status:

To display WebView status, enter **show webview** at the CLI command prompt.

This example shows that WebView is enabled on TCP port 80, the default port number.

```
Matrix(rw)->show webview
 WebView is Enabled. Configured listen port is 80.
```

Enabling / disabling WebView:

To enable or disable WebView, enter **set webview** {**enable** o **disable**} at the CLI command prompt.

This example shows how to enable WebView.

```
Matrix(rw)->set webview enable
```

2.1.5 Process Overview: CLI Startup and General Configuration

Use the following steps as a guide to the startup and general configuration process:

1. Starting and navigating the Command Line Interface (CLI) (Section 2.1.6)
2. Configuring the Line Editor (Section 2.1.7)
3. Setting user accounts and passwords (Section 2.2.1)
4. Enabling or disabling of the management authentication notification MIB (Section 2.2.2)
5. Setting basic device properties (Section 2.2.3)
6. Activating licensed features (Section 2.2.4)
7. Configuring Power over Ethernet (PoE) (Section 2.2.5)
8. Downloading a new firmware image (Section 2.2.6)
9. Reviewing and selecting the boot firmware image (Section 2.2.7)
10. Starting and configuring Telnet (Section 2.2.8)
11. Managing image and configuration files (Section 2.2.9)
12. Configuring the CDP and Cisco discovery protocol (Section 2.2.10)
13. Enabling or disabling the MTU discovery protocol (Section 2.2.11)
14. Pausing, clearing and closing the CLI (Section 2.2.12)
15. Resetting the device (Section 2.2.13)
16. Gathering Technical Support Information (Section 2.2.14)
17. Preparing the device for router mode (Section 2.3)

2.1.6 Starting and Navigating the Command Line Interface

2.1.6.1 Using a Console Port Connection

NOTE: By default, the Matrix Series device is configured with three user login accounts: **ro** for Read-Only access; **rw** for Read-Write access; and **admin** for super-user access to all modifiable parameters. The default password is set to a blank string. For information on changing these default settings, refer to Section 2.2.1.

Once you have connected a terminal to the local console port as described in your *Matrix Series Installation Guide*, the startup screen, Figure 2-2, will display. You can now start the Command Line Interface (CLI) by

- Using a default user account, as described in Section 2.1.6.2, or
- Using an administratively-assigned user account as described in Section 2.1.6.3.

2.1.6.2 Logging in with a Default User Account

If this is the first time your are logging in to the Matrix Series device, or if the default user accounts have not been administratively changed, proceed as follows:

1. At the login prompt, enter one of the following default user names:
   - **ro** for Read-Only access,
   - **rw** for Read-Write access.
   - **admin** for Super User access.
2. Press ENTER. The Password prompt displays.
3. Leave this string blank and press ENTER. The device information and Matrix prompt displays as shown in Figure 2-2.

2.1.6.3 Logging in with Administratively Configured Account

If the device's default user account settings have been changed, proceed as follows:

1. At the login prompt, enter your administratively-assigned user name and press ENTER.
2. At the Password prompt, enter your password and press ENTER.

The notice of authorization and the Matrix prompt displays as shown in Figure 2-2.

NOTE: Users with Read-Write (rw) and Read-Only access can use the **set password** command (Section 2.2.1.4) to change their own passwords. Administrators with Super User (su) access can use the **set system login** command (Section 2.2.1.2) to create and change user accounts, and the **set password** command to change any local account password.

2.1.6.4 Using a Telnet Connection

Once the Matrix Series device has a valid IP address, you can establish a Telnet session from any TCP/IP based node on the network as follows.

1. Telnet to the device's IP address.
2. Enter login (user name) and password information in one of the following ways:
   - If the device's default login and password settings have not been changed, follow the steps listed in Section 2.1.6.2, or
   - Enter an administratively-configured user name and password.

The notice of authorization and the Matrix prompt displays as shown in Figure 2-2.

For information about setting the IP address, refer to Section 2.2.3.2.

For information about configuring Telnet settings, refer to Section 2.2.8.

Refer to the instructions included with the Telnet application for information about establishing a Telnet session.

Figure 2-2 Matrix DFE-Gold Startup Screen

```
login: admin
Password:


M A T R I X DFE GOLD
Command Line Interface

Enterasys Networks, Inc.
50 Minuteman Rd.
Andover, MA 01810-1008 U.S.A.

Phone:  +1 978 684 1000
E-mail: support@enterasys.com
WWW:   http://www.enterasys.com

(c) Copyright Enterasys Networks, Inc. 2005

Module Serial Number: 1234567
Module Firmware Revision: 05.11.00

Matrix DFE Gold(su)->
```

2.1.6.5 Getting Help with CLI Syntax

The Matrix Series device allows you to display usage and syntax information for individual commands by typing **help** or **?** after the command.

2.1.6.6 Using Context-Sensitive Help

Entering **help** after a specific command will display usage and syntax information for that command. This example shows how to display context-sensitive help for the **set length** command:

```
 Matrix(rw)->set length help
Command: set length Number of lines
Usage:  set length  <screenlength>
        screenlength     Length of the screen (5..512, 0 to disable 'more')
```

2.1.6.7 Performing Keyword Lookups

Entering a space and a question mark (**?**) after a keyword will display all commands beginning with the keyword. Figure 2-3 shows how to perform a keyword lookup for the **show snmp** command. In this case, 13 additional keywords are used by the **show snmp** command. Entering a space and a question mark (**?**) after any of these parameters (such as **show snmp user**) will display additional parameters nested within the syntax.

Figure 2-3 Performing a Keyword Lookup

```
Matrix(rw)->show snmp ?
  access            SNMP VACM access configuration
  community         SNMP v1/v2c community name configuration
  context           SNMP VACM context list
  counters          SNMP counters
  engineid          SNMP engine properties
  group             SNMP VACM security to group configuration
  notify            SNMP notify configuration
  notifyfilter      SNMP notify filter configuration
  notifyprofile     SNMP notify profile configuration
  targetaddr        SNMP target address configuration
  targetparams      SNMP target parameters configuration
  user              SNMP USM user configuration
  view              SNMP VACM view tree configuration
Matrix(rw)->show snmp
Matrix(rw)->show snmp user ?
  list              List usernames
  <user>            User name
  remote            Show users with remote SNMP engine ID
  volatile          Show temporary entries
  nonvolatile       Show permanent entries
  read-only         Show r/o entries
  <cr>
Matrix(rw)->show snmp user
```

Entering a question mark (**?**) without a space after a partial keyword will display a list of commands that begin with the partial keyword. Figure 2-4 shows how to use this function for all commands beginning with **co**:

Figure 2-4 Performing a Partial Keyword Lookup

```
Matrixrw)->co?
  configure         Execute a configuration file
  copy              Upload or download an image or configuration file
Matrix(rw)->co
```

NOTE: At the end of the lookup display, the system will repeat the command you entered without the ?.

2.1.6.8 Displaying Scrolling Screens

If the CLI screen length has been set using the **set length** command as described in Section 2.2.3.30, CLI output requiring more than one screen will display `--More--` to indicate continuing screens. To display additional screen output:

- Press any key other than ENTER to advance the output one screen at a time.
- Press ENTER to advance the output one line at a time.

The example in Figure 2-5 shows how the **show mac** command indicates that output continues on more than one screen.

Figure 2-5 Scrolling Screen Output

```
Matrix(rw)->show mac

MAC Address           FID       Port      Type
 ------------------------------------------------------------
 00-00-1d-67-68-69      1       host.0.1  learned
 00-00-02-00-00-00      1       fe.1.2    learned
 00-00-02-00-00-01      1       fe.1.3    learned
 00-00-02-00-00-02      1       fe.1.4    learned
 00-00-02-00-00-03      1       fe.1.5    learned
 00-00-02-00-00-04      1       fe.1.6    learned
 00-00-02-00-00-05      1       fe.1.7    learned
 00-00-02-00-00-06      1       fe.1.8    learned
 00-00-02-00-00-07      1       fe.1.9    learned
 00-00-02-00-00-08      1       fe.1.10   learned
--More--
```

2.1.6.9 Abbreviating and Completing Commands

The Matrix Series device allows you to abbreviate CLI commands and keywords down to the number of characters that will allow for a unique abbreviation. Figure 2-6 shows how to abbreviate the **show netstat** command to **sh net**.

Figure 2-6 Abbreviating a Command

```
Matrix(rw)->sh net
Active Internet connections (including servers)
Proto Recv-Q Send-Q  Local Address          Foreign Address        State
----- ------ ------  --------------------- ---------------------- -------
TCP        0      0  10.21.73.13.23        134.141.190.94.51246   ESTABLISHED
TCP        0    275  10.21.73.13.23        134.141.192.119.4724   ESTABLISHED
TCP        0      0  *.80                  *.*                    LISTEN
TCP        0      0  *.23                  *.*                    LISTEN
UDP        0      0  10.21.73.13.1030      134.141.89.113.514
UDP        0      0  *.161                 *.*
UDP        0      0  *.1025                *.*
UDP        0      0  *.123                 *.*
```

2.1.6.10 Using the Spacebar Auto Complete Function

When the spacebar auto complete function is enabled, pressing the spacebar after a CLI command fragment will allow you to determine if the fragment is unique. If it is, the CLI will complete the fragment on the current display line.

By default, this function is disabled. For more information on enabling it using the **set cli completion** command, refer to Section 2.2.3.20. Figure 2-7 shows how, when the function is enabled, entering **conf** and pressing the spacebar would be completed as configure:

Figure 2-7 Completing a Partial Command

```
Matrix(rw)->conf<SPACEBAR>
Matrix(rw)->configure
```

2.1.7 Configuring the Line Editor

The command line editor determines which key sequences can be used in the CLI. Example: Ctrl+A will move the cursor to beginning of the command line when in Emacs mode. The CLI supports both vi and Emacs-like line editing commands. By default, the "default" line-editing mode is configured, with no special key sequences. See Table 2-3 lists some commonly used Emacs and vi commands. Use the **set line-editor** command (Section 2.1.7.2) to change the line-editor mode.

Table 2-3 Basic Line Editing Emacs & vi Commands

Key Sequence	Emacs Command
Ctrl+A	Move cursor to beginning of line.
Ctrl+B	Move cursor back one character.
Ctrl+C	Abort command.
Ctrl+D	Delete a character.
Ctrl+E	Move cursor to end of line.
Ctrl+F	Move cursor forward one character.
Ctrl+H	Delete character to left of cursor.
Ctrl+I or TAB	Complete word.
Ctrl+K	Delete all characters after cursor.
Ctrl+L or Ctrl+R	Re-display line.
Ctrl+N	Scroll to next command in command history (use the CLI **history** command to display the history).
Ctrl+P	Scroll to previous command in command history.
Ctr1+Q	Resume the CLI process.
Ctr1+S	Pause the CLI process (for scrolling).
Ctrl+T	Transpose characters.
Ctrl+U or Ctrl+X	Delete all characters before cursor.

Table 2-3 Basic Line Editing Emacs & vi Commands (Continued)

Key Sequence	Emacs Command
Ctrl+W	Delete word to the left of cursor.
Ctrl+Y	Restore the most recently deleted item.

Key Sequence	vi Command
h	Move left one character
l	Move right one character
k	Get previous shell command in history
j	Get next shell command in history
$	Go to end of line
0	Go to beginning of line
a	Append
A	Append at end of line
c SPACE	Change character
cl	Change character
cw	Change word
cc	Change entire line
c$	Change everything from cursor to end of line
i	Insert
I	Insert at beginning of line
R	Type over characters
*n*r*c*	Replace the following *n* characters with *c*
*n*x	Delete *n* characters starting at cursor
*n*X	Delete *n* characters to the left of the cursor

Key Sequence	vi Command
d SPACE	Delete character
dl	Delete character
dw	Delete word
dd	Delete entire line
d$	Delete everything from cursor to end of line
D	Same as “d$”
p	Put last deletion after the cursor
P	Put last deletion before the cursor
u	Undo last command
~	Toggle case, lower to upper or vice versa

Commands

The commands used to configure the line-editor are listed below and described in the associated sections as shown.

- show line-editor (Section 2.1.7.1)
- set line-editor (Section 2.1.7.2)

2.1.7.1 show line-editor

Use this command to show current and default line-editor mode and Delete character mode.

show line-editor

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only

Example

This example shows how to view the current and default line-editor mode and Delete mode:

```
Matrix(rw)->show line-editor
Current Line-Editor mode is set to: EMACS
Default Line-Editor mode is set to: Default

Current DEL mode is set to: delete
System DEL mode is set to: delete
```

2.1.7.2 set line-editor

Use this command to set the current and default line editing mode or the way the Delete character is treated by the line editor. You can also set the persistence of your line editing selections.

set line-editor {**emacs** | **vi** | **default** | **delete** {**backspace** | **delete**}} [**default**]

Syntax Description

emacs	Selects emacs command line editing mode. See Table 2-3 for some commonly used emacs commands.
vi	Selects vi command line editing mode.
default	Selects default line editing mode.
delete {**backspace** | **delete**}	Sets the way the line editor treats the Delete ASCII character. **delete backspace** — the line editor will treat Delete (0x7f) as a Backspace (0x08) character. **delete delete** — the line editor will treat Delete as the Delete character (the default condition).
default	(Optional) Make the line editor or Delete mode setting persist for all future sessions.

Command Defaults

If **default** is not entered after selecting a line editing or Delete mode, the selection will apply only to the current session and will not persist for future sessions.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example sets the current line-editor to vi mode:

```
Matrix(rw)->set line-editor vi
```

This example sets the default line-editor to emacs mode and sets the selection to persist for future sessions:

```
Matrix(rw)->set line-editor emacs default
```

2.2 GENERAL CONFIGURATION COMMAND SET

2.2.1 Setting User Accounts and Passwords

Purpose

To change the device's default user login and password settings, and to add new user accounts and passwords.

Commands

The commands used to configure user accounts and passwords are listed below and described in the associated section as shown.

- show system login (Section 2.2.1.1)
- set system login (Section 2.2.1.2)
- clear system login (Section 2.2.1.3)
- set password (Section 2.2.1.4)
- set system password length (Section 2.2.1.5)
- set system password aging (Section 2.2.1.6)
- set system password history (Section 2.2.1.7)
- show system lockout (Section 2.2.1.8)
- set system lockout (Section 2.2.1.9)

2.2.1.1 show system login

Use this command to display user login account information.

show system login

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to display login account information. In this case, device defaults have not been changed:

```
Matrix(su)->show system login
Password history size: 0
Password aging       : disabled

Username        Access      State

admin           super-user  enabled
ro              read-only   enabled
rw              read-write  enabled
```

Table 2-4 provides an explanation of the command output.

Table 2-4 show system login Output Details

Output	What It Displays...
Password history size	Number of previously used user login passwords that will be checked for duplication when the **set password** command is executed. Configured with **set system password history** (Section 2.2.1.7).
Password aging	Number of days user passwords will remain valid before aging out. Configured with **set system password aging** (Section 2.2.1.6).
Username	Login user names.
Access	Access assigned to this user account: **super-user**, **read-write** or **read-only**.
State	Whether this user account is **enabled** or **disabled**.

2.2.1.2 set system login

Use this command to create a new user login account, or to disable or enable an existing account. The Matrix Series device supports up to 16 user accounts, including the admin account, which cannot be disabled or deleted.

set system login *username* {**super-user** | **read-write** | **read-only**} {**enable** | **disable**}

Syntax Description

username	Specifies a login name for a new or existing user. This string can be a maximum of 80 characters, although a maximum of 16 characters is recommended for proper viewing in the **show system login** display.
super-user | **read-write** | **read-only**	Specifies the access privileges for this user.
enable | **disable**	Enables or disables the user account. **NOTE:** The default admin (su) account cannot be disabled.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to enable a new user account with the login name "netops" with super user access privileges:

```
Matrix(su)->set system login netops super-user enable
```

2.2.1.3 clear system login

Use this command to remove a local login user account.

clear system login *username*

Syntax Description

username	Specifies the login name of the account to be cleared.
	NOTE: The default admin (su) account cannot be deleted.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to remove the “netops” user account:

```
Matrix(su)->clear system login netops
```

2.2.1.4 set password

Use this command to change system default passwords or to set a new login password on the CLI.

set password [*username*]

NOTES: Only users with admin (**su**) access privileges can change any password on the system.

Users with Read-Write (**rw**) access privileges can change their own passwords, but cannot enter or modify other system passwords.

Passwords must be a minimum of 8 characters and a maximum of 40 characters.

IIf configured, password length must conform to the minimum number of characters set with the **set system password length** command (Section 2.2.1.5).

The **admin** password can be reset by toggling dip switch 8 on the device as described in your *Matrix Series Installation Guide*.

Syntax Description

username	(Only available to users with super-user access.) Specifies a system default or a user-configured login account name. By default, the Matrix Series device provides the following account names: • **ro** for Read-Only access, • **rw** for Read-Write access. • **admin** for Super User access. (This access level allows Read-Write access to all modifiable parameters, including user accounts.)

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write users can change their own passwords. Super Users (Admin) can change any password on the system.

Examples

This example shows how a super-user would change the Read-Write password from the system default (blank string):

```
Matrix(su)->set password rw
Please enter new password: ********
Please re-enter new password: ********
Password changed.
Matrix(su)->
```

This example shows how a user with Read-Write access would change his password:

```
Matrix(rw)->set password
Please enter old password: ********
Please enter new password: ********
Please re-enter new password: ********
Password changed.
Matrix(rw)->
```

2.2.1.5 set system password length

Use this command to set the minimum user login password length.

set system password length *characters*

Syntax Description

characters	Specifies the minimum number of characters for a user account password. Valid values are 0 to 40.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Examples

This example shows how to set the minimum system password length to 8 characters:

```
Matrix(su)->set system password length 8
```

2.2.1.6 set system password aging

Use this command to set the number of days user passwords will remain valid before aging out, or to disable user account password aging.

set system password aging {*days* | **disable**}

Syntax Description

days	Specifies the number of days user passwords will remain valid before aging out. Valid values are **1** to **365**.
disable	Disables password aging.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to set the system password age time to 45 days:

```
Matrix(su)->set system password aging 45
```

2.2.1.7 set system password history

Use this command to set the number of previously used user login passwords that will be checked for password duplication. This prevents duplicate passwords from being entered into the system with the **set password** command.

set system password history *size*

Syntax Description

size	Specifies the number of passwords checked for duplication. Valid values are **0** to **10**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to configure the system to check the last 10 passwords for duplication

```
Matrix(su)->set system password history 10
```

2.2.1.8 show system lockout

Use this command to display settings for locking out users after failed attempts to log in to the system.

show system lockout

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to display user lockout settings. In this case, device defaults have not been changed:

```
Matrix(su)->show system lockout
Lockout attempts: 3
Lockout time:     15 minutes.
```

Table 2-5 provides an explanation of the command output. These settings are configured with the **set system lockout** command (Section 2.2.1.9).

Table 2-5 show system lockout Output Details

Output	What It Displays...
Lockout attempts	Number of failed login attempts allowed before a read-write or read-only user's account will be disabled.
Lockout time	Number of minutes the default admin user account will be locked out after the maximum login attempts.

2.2.1.9 set system lockout

Use this command to set the number of failed login attempts before locking out (disabling) a read-write or read-only user account, and the number of minutes to lockout the default admin super user account after maximum login attempts. Once a user account is locked out, it can only be re-enabled by a super user with the **set system login** command (Section 2.2.1.2).

set system lockout {[**attempts** *attempts*] [**time** *time*]}

Syntax Description

attempts *attempts*	Specifies the number of failed login attempts allowed before a read-write or read-only user's account will be disabled. Valid values are **1** to **10**.
time *time*	Specifies the number of minutes the default admin user account will be locked out after the maximum login attempts. Valid values are **0** to **60**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Examples

This example shows how to set login attempts to 5 and lockout time to 30 minutes:

```
Matrix(su)->set system lockout attempts 5 time 30
```

2.2.2 Managing the Management Authentication Notification MIB

Purpose

This MIB provides controls for enabling/disabling the sending of SNMP notifications when a user login authentication event occurs for various management access types. The types of access currently supported by the MIB include console, telnet, ssh, and web.

Commands

The CLI commands used to set the Management Authentication Notification are listed below and described in the associated section as shown.

- show mgmt-auth-notify (Section 2.2.3.1)
- set mgmt-auth-notify (Section 2.2.3.2)
- clear mgmt-auth-notify (Section 2.2.3.3)

NOTE: Ensure that SNMP is correctly configured on the DFE in order to send these notifications. Refer to Chapter 4 for SNMP configuration information.

2.2.2.1 show mgmt-auth-notify

Use this command to display the current setting for the Management Authentication Notification MIB.

show mgmt-auth-notify

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the current information for the Management Authentication Notification.:

```
Matrix(su)->show mgmt-auth-notify

Management Type  Status
---------------  --------
console          enabled
ssh              enabled
telnet           enabled
web              enabled
```

2.2.2.2 set mgmt-auth-notify

Use this command to either enable or disable the Management Authentication Notification MIB. By selecting the optional Management access type, a user can specifically enable or disable a single access type, multiple access types or all of the access types. The default setting is that all Management Authentication Notification types are enabled.

set mgmt-auth-notify {**enable** | **disable**}{**console** | **ssh** | **telnet** | **web**}

NOTE: Insure that SNMP is correctly configured on the DFE in order to send these notifications, refer to the following chapter for configuring SNMP (Chapter 4).

Syntax Description

enable	Enable selected or all notifications.
disable	Disable selected or all notifications.
console	(Optional) console authentications
ssh	(Optional) ssh authentications
telnet	(Optional) telnet authentications
web	(Optional) web authentications

Command Defaults

If none of the optional Management Authentication Access types are entered, than all authentications types listed above will either be enabled or disabled.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set all the authentication types to be disabled on the Management Authentication Notification MIB. That information is then displayed with the **show** command:

```
Matrix(su)->set mgmt-auth-notify disable
Matrix(su)->show mgmt-auth-notify

Management Type  Status
---------------  --------
console          disabled
ssh              disabled
telnet           disabled
web              disabled
```

This example shows how to set only the console and telnet authentication access types to be enabled on the Management Authentication Notification MIB. That information is then displayed with the **show** command.:

```
Matrix(su)->set mgmt-auth-notify enable console telnet
Matrix(su)->show mgmt-auth-notify

Management Type  Status
---------------  --------
console          enabled
ssh              disabled
telnet           enabled
web              disabled
```

2.2.2.3 clear mgmt-auth-notify

Use this command to set the current setting for the Management Authentication Notification access types to the default setting of enabled.

clear mgmt-auth-notify

NOTE: Ensure that SNMP is correctly configured on the DFE in order to send these notifications. Refer to Chapter 4 for SNMP configuration information.

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example displays the state of Management Authentication Notification access types prior to using the **clear** command, then displays the same information after using the **clear** command:

```
Matrix(su)->show mgmt-auth-notify

Management Type  Status
---------------  --------
console          enabled
ssh              disabled
telnet           enabled
web              disabled

Matrix(su)->clear mgmt-auth-notify

Matrix(su)->show mgmt-auth-notify

Management Type  Status
---------------  --------
console          enabled
ssh              enabled
telnet           enabled
web              enabled
```

2.2.3 Setting Basic Device Properties

Purpose

To display and set the system IP address and other basic system (device) properties, including time, contact name and alias, physical asset IDs for modules, terminal output, timeout, and version information.

Commands

The commands used to set basic system information are listed below and described in the associated section as shown.

- show ip address (Section 2.2.3.1)
- set ip address (Section 2.2.3.2)
- clear ip address (Section 2.2.3.3)
- show ip gratuitous-arp (Section 2.2.3.4)
- set ip gratuitous-arp (Section 2.2.3.5)
- clear ip gratuitous-arp (Section 2.2.3.6)
- show system (Section 2.2.3.7)
- show system hardware (Section 2.2.3.8)
- show system utilization (Section 2.2.3.9)
- set system utilization threshold (Section 2.2.3.10)
- clear system utilization (Section 2.2.3.11)
- show time (Section 2.2.3.12)
- set time (Section 2.2.3.13)
- show summertime (Section 2.2.3.14)
- set summertime (Section 2.2.3.15)
- set summertime date (Section 2.2.3.16)
- set summertime recurring (Section 2.2.3.17)
- clear summertime (Section 2.2.3.18)
- set prompt (Section 2.2.3.19)

- set cli completion (Section 2.2.3.20)
- loop (Section 2.2.3.21)
- show banner motd (Section 2.2.3.22)
- set banner motd (Section 2.2.3.23)
- clear banner motd (Section 2.2.3.24)
- show version (Section 2.2.3.25)
- set system name (Section 2.2.3.26)
- set system location (Section 2.2.3.27)
- set system contact (Section 2.2.3.28)
- set width (Section 2.2.3.29)
- set length (Section 2.2.3.30)
- show logout (Section 2.2.3.31)
- set logout (Section 2.2.3.32)
- show physical alias (Section 2.2.3.33)
- set physical alias (Section 2.2.3.34)
- clear physical alias (Section 2.2.3.35)
- show physical assetid (Section 2.2.3.36)
- set physical assetid (Section 2.2.3.37)
- clear physical assetid (Section 2.2.3.38)

2.2.3.1 show ip address

Use this command to display the system IP address and subnet mask.

show ip address

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the system IP address and subnet mask:

```
Matrix(rw)->show ip address
Name                    Address                 Mask
----------------        ----------------        ----------------
host                    10.42.13.20              255.255.0.0
```

2.2.3.2 set ip address

Use this command to set the system IP address, subnet mask and default gateway.

set ip address *ip-address* [**mask** *ip-mask*] [**gateway** *ip-gateway*]

Syntax Description

ip-address	Sets the IP address for the system.
mask *ip-mask*	(Optional) Sets the system's subnet mask.
gateway *ip-gateway*	(Optional) Sets the system's default gateway (next-hop device).

Command Defaults

If not specified, *ip-mask* will be set to the natural mask of the *ip-address* and *ip-gateway* will be set to the *ip-address*.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the system IP address to 10.1.10.1 with a mask of 255.255.128.0 and a default gateway of 10.1.0.1:

```
Matrix(rw)->set ip address 10.1.10.1 mask 255.255.128.0 gateway 10.1.10.1
```

2.2.3.3 clear ip address

Use this command to clear the system IP address.

clear ip address

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the system IP address:

```
Matrix(rw)->clear ip address
```

2.2.3.4 show ip gratuitous-arp

Use this command to display the gratuitous ARP processing behavior.

show ip gratuitous-arp

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the IP gratuitous-arp process for both requests and replies.

```
Matrix(rw)->show ip gratuitous-arp
Processing gratuitous ARP requests and replies.
```

2.2.3.5 set ip gratuitous-arp

Use this command to control the gratuitous ARP processing behavior.

set ip gratuitous-arp [request] [reply] [both]]

Syntax Description

request	Process only gratuitous ARP requests.
reply	Process only gratuitous ARP replies.
both	Process both requests and replies.

Command Defaults

Disabled by default

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example sets both gratuitous ARP requests and replies:

```
Matrix(rw)->set ip gratuitous-arp both
```

2.2.3.6 clear ip gratuitous-arp

Use this command to stop all gratuitous ARP processing.

clear ip gratuitous-arp

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the gratuitous-arp processing:

```
Matrix(rw)->clear ip gratuitous-arp
```

2.2.3.7 show system

Use this command to display system information, including contact information, power and fan tray status and uptime.

show system

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display system information:

```
Matrix(rw)->show system
System contact:
System location:
System name:

PS1-Status     PS2-Status
-------------  -------------
ok             not installed

Fan1-Status
-------------
ok

Temp-Alarm     Uptime d,h:m:s  Logout
-------------  --------------  -------------
off                0,19:40:00  10 min

PS1-Type       PS2-Type
-------------  -------------
6C207-1        not installed
```

Table 2-6 provides an explanation of the command output.

Table 2-6 show system Output Details

Output	What It Displays...
System contact	Contact person for the system. Default of a blank string can be changed with the **set system contact** command (Section 2.2.3.28).
System location	Where the system is located. Default of a blank string can be changed with the **set system location** command (Section 2.2.3.27).
System name	Name identifying the system. Default of a blank string can be changed with the **set system name** command (Section 2.2.3.26).
PS1 and PS2-Status	Operational status for power supply 1 and, if installed, power supply 2.
Fan Status	Operational status of the fan tray.
Temp-Alarm	Whether or not the system temperature alarm is off (within normal temperature range) or on.
Uptime d,h:m:s	System uptime.
Logout	Time an idle console or Telnet CLI session will remain connected before timing out. Default of 15 minutes can be changed with the **set logout** command (Section 2.2.3.32).
PS1 and PS2-Type	Model number of power supply 1 and, if installed, power supply 2.

2.2.3.8 show system hardware

Use this command to display the system's hardware configuration.

show system hardware

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

The example on the following page shows a portion of the information displayed with the **show system hardware** command.

NOTE: Depending on the hardware configuration of your Matrix system, your output will vary from the example shown.

```
Matrix(rw)->show system hardware

CHASSIS HARDWARE INFORMATION
----------------------------
Chassis Type:                   Matrix N7
   Chassis Serial Number:       0001a300611b
   Power Supply 1:              Not Installed
   Power Supply 2:              Installed & Operating, AC, Not Redundant
   Chassis Fan:                 Installed & Operating

SLOT HARDWARE INFORMATION
-------------------------
SLOT 1
      Model:                    4H4282-49
      Serial Number:            0123456789AB
      Part Number:              6543210
      Vendor ID:                1
      Base MAC Address:         11-22-33-44-55-66
      Router MAC Address:       11-22-33-44-55-67
      Hardware Version:         5
      Firmware Version:         02.00.13
      BootCode Version:         01.00.07
      CPU Version:              8 (PPC 740/750)
      UpLink:                   Not Present
      SDRAM:                    128 MB
      NVRAM:                    8 KB
      Flash System:             32 MB
         /flash0 free space:    11 MB
         /flash1 free space:    14 MB
Dip Switch Bank  1   2   3   4   5   6   7   8
      Position: OFF OFF OFF OFF OFF OFF OFF OFF
      HOST CHIP
         Revision:              1.0
      FABRIC CHIP               0          1
         Revision:              1.0        1.0
      SWITCH CHIP               0          1          2
         Block ID:              0          1          3
         Revision:              1.50/150   1.50/150   1.50/150
         Lookup DDR:            8 MB       8 MB       8 MB
         Transmit DDR:          8 MB       8 MB       8 MB
         Receive DDR:           8 MB       8 MB       8 MB
         Routing DDR:           8 MB       8 MB       8 MB
      MAC CHIP                  0          1          2
         Model:                 FastEnet   FastEnet   FTM1
         Revision:              1          1          0
      PHY CHIP 0
         Model:                 BCM5226
         Revision:              2
```

2.2.3.9 show system utilization

Use this command to display system resource utilization information.

show system utilization [**cpu** | **process** | **storage**] [**slot** *slot*]

Syntax Description

cpu | **process** | **storage**	(Optional) Displays total CPU, individual process, or storage resource utilization only.
slot *slot*	(Optional) Displays system resource utilization for a specific module.

Command Defaults

- If not specified, CPU, process, and storage system utilization information will be displayed.
- If not specified, information for all modules will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display all system utilization information for the module in slot 1:

```
Matrix(rw)->show system utilization slot 1

CPU Utilization Threshold Traps enabled: Threshold = 80.0%

Total CPU Utilization:

Slot    CPU                5 sec   1 min   5 min
-----------------------------------------------------
1       1                  3.6%    3.0%    3.0%

** Output continued on next page **
```

```
** Output continued from previous page **

Process Utilization:

Slot: 1 CPU: 1

Name                            ProcID 5 sec   1 min   5 min
-------------------------------------------------------------
 CLI                             1        0.0%    0.0%    0.0%
 Chassis Data Synchronization    2        0.0%    0.0%    0.0%
 Connection Maintenance          3        1.0%    0.5%    0.5%
 Hardware Maintenece             4        0.0%    0.0%    0.0%
 Image & Config Management       5        0.0%    0.0%    0.0%
 Persistent Data Management      6        0.0%    0.0%    0.0%
 Runtime Diagnostics             7        0.0%    0.0%    0.0%
 SNMP                            8        0.0%    0.0%    0.0%
 Syslog                          9        0.0%    0.0%    0.0%
 Switch                          10       0.0%    0.0%    0.0%
 Switch CDP                      11       0.0%    0.0%    0.0%
 Switch Dot1x                    12       0.0%    0.0%    0.0%
 Switch Filter Database          13       0.0%    0.0%    0.0%
 Switch GVRP                     14       0.0%    0.0%    0.0%
 Switch Host IP                  15       0.1%    0.1%    0.1%
 Switch IGMP                     16       0.0%    0.0%    0.0%
 Switch LACP                     17       0.0%    0.0%    0.0%
 Switch MAC Authentication       18       0.0%    0.0%    0.0%
 Switch MAC Locking              19       0.0%    0.0%    0.0%
 Switch MTU Discovery            20       0.0%    0.0%    0.0%
 Switch Node & Alias             21       0.0%    0.0%    0.0%
 Switch Packet Processing        22       0.1%    0.1%    0.1%
 Switch POE                      23       0.0%    0.0%    0.0%
 Switch Port Management          24       0.0%    0.0%    0.0%
 Switch PWA                      25       0.0%    0.0%    0.0%
 Switch Radius                   26       0.0%    0.0%    0.0%
 Switch Radius Accounting        27       0.0%    0.0%    0.0%
 Switch RMON                     28       0.0%    0.0%    0.0%
 Switch RMON Capture             29       0.0%    0.0%    0.0%
 Switch SMON                     30       0.0%    0.0%    0.0%
 Switch SNTP                     31       0.0%    0.0%    0.0%
 Switch STP                      32       0.0%    0.0%    0.0%
 Switch UPN                      33       0.0%    0.0%    0.0%

** Output continued on next page **
```

```
** Output continued from previous page **

 Name                              ProcID 5 sec   1 min   5 min
-------------------------------------------------------------------
 Switch Web Server                 34       1.4%    1.4%    1.4%
 Router Misc.                      35       0.0%    0.0%    0.0%
 Router Multicast                  36       0.0%    0.0%    0.0%
 Router Control Plane              37       0.0%    0.0%    0.0%
 Router IP                         38       0.0%    0.0%    0.0%
 Router DHCPS                      39       0.0%    0.0%    0.0%
 Router OSPF                       40       0.0%    0.0%    0.0%
 Router RIP                        41       0.0%    0.0%    0.0%
 Router VRRP                       42       0.0%    0.0%    0.0%
 Router DVMRP                      43       0.0%    0.0%    0.0%
 Router PIM                        44       0.0%    0.0%    0.0%
 Router PIMDM                      45       0.0%    0.0%    0.0%
 Router ARP                        46       0.0%    0.0%    0.0%
 Router LSNAT                      47       0.0%    0.0%    0.0%
 Interrupts                        48       0.0%    0.0%    0.0%
 OTHER                             49       0.0%    0.0%    0.0%
 IDLE                              50      96.4%   97.0%   97.0%

Storage Utilization:

Slot: 1

Type        Description              Size (Kb)      Available (Kb)
-------------------------------------------------------------------
 RAM        RAM device 1               131072               22192
 Flash      Images & Miscellaneous      16384                4138
 Flash      Nonvolatile Data Storage    16384               14308
```

2.2.3.10 set system utilization threshold

Use this command to set the threshold for sending CPU utilization notification messages. The value range is [1..1000] and represents the % of system utilization to use as the trap threshold.

set system utilization threshold *threshold*

Syntax Description

threshold	Specifies a threshold value (in 1/10 of a percent).Valid range is **1 - 1000**. A value of **0** will disable utilization notification messages.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the system utilization threshold to 100%:

```
Matrix(rw)->set system utilization threshold 1000
```

2.2.3.11 clear system utilization

Use this command to clear the threshold for sending CPU utilization notification messages.

clear system utilization

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the system utilization threshold:

```
Matrix(rw)->clear system utilization 1000
```

2.2.3.12 show time

Use this command to display the current time of day in the system clock.

show time

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the current time. The output shows the day of the week, month, day, and the time of day in hours, minutes, and seconds and the year:

```
Matrix(rw)->show time
THU SEP 05 09:21:57 2002
```

2.2.3.13 set time

Use this command to change the time of day on the system clock.

set time [*mm/dd/yyyy*] [*hh:mm:ss*]

Syntax Description

[*mm/dd/yyyy*] [*hh:mm:ss*]	Sets the time in: • month, day, year and/or • 24-hour format At least one set of time parameters must be entered.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the system clock to 7:50 a.m:

```
Matrix(rw)->set time 7:50:00
```

2.2.3.14 show summertime

Use this command to display daylight savings time settings.

show summertime

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display daylight savings time settings:

```
Matrix(rw)->show summertime
Summertime is disabled and set to ''
Start : SUN APR 04 02:00:00 2004
End   : SUN OCT 31 02:00:00 2004
Offset: 60 minutes (1 hours 0 minutes)
Recurring: yes, starting at 2:00 of the first Sunday of April and ending at 2:00
 of the last Sunday of October
```

2.2.3.15 set summertime

Use this command to enable or disable the daylight savings time function.

set summertime {**enable** | **disable**} [*zone*]

Syntax Description

enable | **disable**	Enables or disables the daylight savings time function.
zone	(Optional) Applies a name to the daylight savings time settings.

Command Defaults

If a *zone* name is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable daylight savings time function:

```
Matrix(rw)->set summertime enable
```

2.2.3.16 set summertime date

Use this command to configure specific dates to start and stop daylight savings time. These settings will be non-recurring and will have to be reset annually.

set summertime date *start_month start_date start_year start_hr_min end_month end_date end_year end_hr_min* [*offset_minutes*]

Syntax Description

start_month	Specifies the month of the year to start daylight savings time.
start_date	Specifies the day of the month to start daylight savings time.
start_year	Specifies the year to start daylight savings time.
start_hr_min	Specifies the time of day to start daylight savings time. Format is hh:mm.
end_month	Specifies the month of the year to end daylight savings time.
end_date	Specifies the day of the month to end daylight savings time.
end_year	Specifies the year to end daylight savings time.
end_hr_min	Specifies the time of day to end daylight savings time. Format is hh:mm.
offset_minutes	(Optional) Specifies the amount of time in minutes to offset daylight savings time from the non-daylight savings time system setting. Valid values are **1** - **1440**.

Command Defaults

If an *offset* is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set a daylight savings time start date of April 4, 2004 at 2 a.m. and an ending date of October 31, 2004 at 2 a.m. with an offset time of one hour:

```
Matrix(rw)->set summertime date April 4 2004 02:00 October 31 2004 02:00 60
```

2.2.3.17 set summertime recurring

Use this command to configure recurring daylight savings time settings. These settings will start and stop daylight savings time at the specified day of the month and hour each year and will not have to be reset annually.

set summertime recurring *start_week start_day start_month start_hr_min end_week end_day end_month end_hr_min* [*offset_minutes*]

Syntax Description

start_week	Specifies the week of the month to restart daylight savings time. Valid values are: **first**, **second**, **third**, **fourth**, and **last**.
start_day	Specifies the day of the week to restart daylight savings time.
start_hr_min	Specifies the time of day to restart daylight savings time. Format is hh:mm.
end_week	Specifies the week of the month to end daylight savings time.
end_day	Specifies the day of the week to end daylight savings time.
end_hr_min	Specifies the time of day to end daylight savings time. Format is hh:mm.
offset_minutes	(Optional) Specifies the amount of time in minutes to offset daylight savings time from the non-daylight savings time system setting. Valid values are **1** - **1440**.

Command Defaults

If an *offset* is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how set daylight savings time to recur start date of April 4, 2004 at 2 a.m. and an ending date of October 31, 2004 at 2 a.m. with an offset time of one hour:

```
Matrix(rw)->set summertime recurring first Sunday April 02:00 last Sunday
October 02:00 60
```

2.2.3.18 clear summertime

Use this command to clear the daylight savings time configuration.

clear summertime

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the daylight savings time configuration:

```
Matrix(rw)->clear summertime
```

2.2.3.19 set prompt

Use this command to modify the command prompt.

set prompt *"prompt_string"*

Syntax Description

prompt_string	Specifies a text string for the command prompt.
	NOTE: A prompt string containing a space in the text must be enclosed in quotes as shown in the example below.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the command prompt to Switch 1:

```
Matrix(rw)->set prompt "Switch 1"
Switch 1(rw)->
```

2.2.3.20 set cli completion

Use this command to enable or disable the CLI command completion function. When enabled, this allows you to complete a unique CLI command fragment using the keyboard spacebar.

set cli completion {**enable** | **disable**} [**default**]

Syntax Description

enable | **disable**	Enables or disables the CLI command completion function.
default	(Optional) Maintains the status for all future sessions.

Command Defaults

If not specified, the status setting will not be maintained as the default.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the CLI command completion function and maintain it as the default setting:

```
Matrix(rw)->set cli completion enable default
```

2.2.3.21 loop

Use this command to execute a command loop.

loop *count* [*delay*] [**-r**]

Syntax Description

count	Specifies the number of times to loop. A value of 0 will make the command loop forever.
delay	(Optional) Specifies the number of seconds to delay between executions.
-r	(Optional) Refreshes the cursor to the home position on the screen.

Command Defaults

- If a *delay* is not specified, none will be set.
- If not specified, the cursor will not refresh.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to execute a command loop 10 times with a 30 second delay:

```
Matrix(rw)->loop 10 30
```

2.2.3.22 show banner motd

Use this command to show the banner message of the day that will display at session login.

show banner motd

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the banner message of the day:

```
Matrix(rw)->show banner motd
Not one hundred percent efficient, of course ... but nothing ever is.
                -- Kirk, "Metamorphosis", stardate 3219.8
```

2.2.3.23 set banner motd

Use this command to set the banner message of the day displayed at session login.

set banner motd *message*

Syntax Description

message	Specifies a message of the day. This is a text string that can be formatted with tabs (**\t**) and new line escape (**\n**) characters. The \t tabs will be converted into 8 spaces in the banner output.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the message of the day banner to read “Change is the price of survival.

-- Winston Churchill” :

```
Matrix(rw)->set banner motd Change is the price of survival. n/ /t--Winston
Churchill
```

2.2.3.24 clear banner motd

Use this command to clear the banner message of the day displayed at session login to a blank string.

clear banner motd

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the message of the day banner to a blank string:

```
Matrix(rw)->clear banner motd
```

2.2.3.25 show version

Use this command to display hardware and firmware information. Refer to Section 2.2.6 for instructions on how to download a firmware image.

show version

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display version information:

```
Matrix(rw)->show version
Copyright (c) 2004 by Enterasys Networks, Inc.

Slot    Model             Serial #              Versions
1       4G4202-60         041405833244          Hw: 0
                                                Bp: 01.00.15
                                                Fw: 05.01.57

2       4H4282-49         03320004320A          Hw: 0
                                                Bp: 01.00.15
                                                Fw: 05.01.51
```

Table 2-7 provides an explanation of the command output.

Table 2-7 show version Output Details

Output	What It Displays...
Slot	Slot location designation. For details on how slots are numbered, refer to Section 3.1.1.
Model	Device's model number.

Table 2-7 show version Output Details (Continued)

Output	What It Displays...
Serial #	Device's serial number of the device.
Versions	• **Hw**: Hardware version number. • **Bp**: BootPROM version • **Fw**: Current firmware version number.

2.2.3.26 set system name

Use this command to configure a name for the system.

set system name [*string*]

Syntax Description

string	(Optional) Specifies a text string that identifies the system.
	NOTE: A name string containing a space in the text must be enclosed in quotes as shown in the example below.

Command Defaults

If *string* is not specified, the system name will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the system name to Information Systems:

```
Matrix(rw)->set system name "Information Systems"
```

2.2.3.27 set system location

Use this command to identify the location of the system.

set system location [*string*]

Syntax Description

string	(Optional) Specifies a text string that indicates where the system is located. **NOTE:** A location string containing a space in the text must be enclosed in quotes as shown in the example below.

Command Defaults

If *string* is not specified, the location name will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the system location string:

```
Matrix(rw)->set system location "Bldg N32-04 Closet 9"
```

2.2.3.28 set system contact

Use this command to identify a contact person for the system.

set system contact [*string*]

Syntax Description

string	(Optional) Specifies a text string that contains the name of the person to contact for system administration.

NOTE: A contact string containing a space in the text must be enclosed in quotes as shown in the example below.

Command Defaults

If *string* is not specified, the contact name will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the system contact string:

```
Matrix(rw)->set system contact "Joe Smith"
```

2.2.3.29 set width

Use this command to set the number of columns for the terminal connected to the device's console port. The length of the CLI is set using the **set length** command as described in Section 2.2.3.30.

set width *screenwidth*

Syntax Description

screenwidth	Sets the number of terminal columns. Valid values are **50** to **150**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the terminal columns to 50:

```
Matrix(rw)->set width 50
```

2.2.3.30 set length

Use this command to set the number of lines the CLI will display.

set length *screenlength*

Syntax Description

screenlength	Sets the number of lines in the CLI display. Valid values are **0**, which disables the scrolling screen feature described in Section 2.1.6.8, and from **5** to **512**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the terminal length to 50:

```
Matrix(rw)->set length 50
```

2.2.3.31 show logout

Use this command to display the time (in seconds) an idle console or Telnet CLI session will remain connected before timing out.

show logout

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the CLI logout setting:

```
Matrix(rw)->show logout
Logout currently set to: 10 minutes.
```

2.2.3.32 set logout

Use this command to set the time (in minutes) an idle console or Telnet CLI session will remain connected before timing out.

set logout *timeout*

Syntax Description

timeout	Sets the number of minutes the system will remain idle before timing out.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the system timeout to 10 minutes:

```
Matrix(rw)->set logout 10
```

2.2.3.33 show physical alias

Use this command to display the alias, a text name, for one or more physical objects.

show physical alias [**chassis**] | [**slot** *slot*] | [**backplane** *backplane*] | [**module** *module*] | [**powersupply** *powersupply*] | [**powersupply-slot** *powersupply-slot*] | [**fan**] | [**fan-slot**] | [**port-string** *port-string*]

Syntax Description

chassis	(Optional) Displays the alias set for the chassis.
slot *slot*	(Optional) Displays the alias set for a specified slot in the chassis.
backplane *backplane*	(Optional) Displays the alias set for the backplane. Valid values are **1** for FTM 1 and **2** for FTM 2.
module *module*	(Optional) Displays the alias set for a specified module. A maximum of one module alias per slot is allowed.
powersupply *powersupply*	(Optional) Displays the alias set for a specified power supply. Valid values are **1** or **2**.
powersupply-slot *powersupply-slot*	(Optional) Displays an alias set for a specific power supply slot.
fan	(Optional) Displays the alias set for the fan tray.
fan-slot	(Optional) Displays an alias for the fan tray's slot.
port-string *port-string*	(Optional) Displays the alias set for a specified *port-string*. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If no parameters are specified, all physical alias information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display physical alias information for the chassis. In this case, the chassis entity is 1 and there is no alias currently set for the chassis:

```
Matrix(rw)->show physical alias chassis
chassis-1           alias=<empty string> entity=1
```

2.2.3.34 set physical alias

Use this command to set the alias, a text name, for a physical object.

set physical alias {[**chassis**] [**slot** *slot*] [**backplane** *backplane*] [**module** *module*] [**powersupply** *powersupply*] [**powersupply-slot** *powersupply-slot*] [**fan**] [**fan-slot**] [**port-string** *port-string*]} [*string*]

Syntax Description

chassis	Sets an alias for the chassis.
slot *slot*	Sets an alias for a specific slot in the chassis.
backplane *backplane*	Sets an alias for the backplane. Valid values are **1** for FTM 1 and **2** for FTM 2.
module *module*	Sets an alias for a specific module. A maximum of one module per slot is allowed.
powersupply *powersupply*	Sets an alias for a specific power supply. Valid values are **1** or **2**.
powersupply-slot *powersupply-slot*	Sets an alias for a specific power supply slot.
fan	Sets an alias for the fan tray.
fan-slot	Sets an alias for the fan tray's slot.
port-string *port-string*	Sets an alias for a specific port.
string	(Optional) Assigns a text string alias to the specified physical object.

Command Defaults

If *string* is not specified, the alias of the type specified will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the alias for the chassis to “chassisone”:

```
Matrix(rw)->set physical alias chassis chassisone
```

2.2.3.35 clear physical alias

Use this command to reset the alias for a physical object to a zero-length string.

clear physical alias {[**chassis**] [**slot** *slot*] [**backplane** *backplane*] [**module** *module*] [**powersupply** *powersupply*] [**powersupply-slot** *powersupply-slot*] [**fan**] [**fan-slot**] [**port-string** *port-string*]}

Syntax Description

chassis	Clears the chassis alias.
slot *slot*	Clears and alias for a specific slot.
backplane *backplane*	Clears and alias for a specific backplane. Valid values are **1** for FTM 1 and **2** for FTM 2.
module *module*	Clears an alias for a specific module.
powersupply *powersupply*	Clears an alias for a specific power supply. Valid values are **1** or **2**.
fan	Clears the fan tray alias
port-string *port-string*	Clears an alias for a specific port.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set clear the alias set for the chassis:

```
Matrix(rw)->clear physical alias chassis
```

2.2.3.36 show physical assetid

Use this command to display the asset ID for a module.

show physical assetid module *module*

Syntax Description

module *module*	Specifies the module for which to display an asset ID.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display asset ID information for module 1. In this case, none has been configured:

```
Matrix(rw)->show physical assetid module 1
module-1            assetID=<empty string> entity=71
```

2.2.3.37 set physical assetid

Use this command to set the asset ID for a module.

set physical assetid module *module string*

Syntax Description

module *module*	Sets an asset ID for a specific module.
string	Specifies the asset ID.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the asset ID information for module 1 to “dfe1”:

```
Matrix(rw)->set physical assetid module 1 dfe1
```

2.2.3.38 clear physical assetid

Use this command to reset the asset ID for a module to a zero-length string.

clear physical assetid module *module*

Syntax Description

module *module*	Specifies the module for which to clear the asset ID.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the asset ID for module 1:

```
Matrix(rw)->clear physical assetid module 1
```

2.2.4 Activating Licensed Features

In order to enable advanced features, such as redundant management, routing protocols, and extended ACLs on a Matrix Series device, you must purchase and activate a license key. If you have purchased a license, you can proceed to activate your license as described in this section. If you wish to purchase a license, contact Enterasys Networks Sales.

About Redundant Management on Matrix DFE-Gold Series Modules

NOTE: Interoperability of Matrix DFE-Gold Series modules is dependent upon module placement rules during installation in the chassis. For details on these rules and their effects on system management, refer to the *Matrix DFE-Gold Series Installation Guide.*

The DFE-Gold System Management Module (SMM) coordinates and controls the configuration of the entire chassis. By default, this is the module installed in slot 1. Access to the SMM is available through any console (COM) port on any module in the chassis. Only one CLI session can be active at any one time, and active status is granted to the first connection to any of the console ports.

In order to enable switch and routing redundancy on a Matrix DFE-Gold Series device, you must purchase and activate a license key. If you have purchased a redundancy license, you can proceed to activate it as described in this section. If you wish to purchase a redundancy license, contact Enterasys Networks Sales.

When a redundancy license key is purchased and activated as described in this section, redundancy can be configured on the module in slot 2 of the chassis. Then, in the event module 1 fails, module 2 will assume chassis management.

Purpose

To activate and verify licensed features.

Commands

The commands used to activate and verify licensed features are listed below and described in the associated section as shown:

- set license (Section 2.2.4.1)
- show license (Section 2.2.4.2)
- clear license (Section 2.2.4.3)

2.2.4.1 set license

When an advanced license is available, use this command to activate licensed features. If this is available on your Matrix Series device, a unique license key will display in the **show license** command output.

set license {**advanced** | **redundancy**} *license-key* [**slot** *slot*]

Syntax Description

advanced	Activates advanced routing features.
redundancy	Activates management module redundancy.
license-key	Specifies your unique 16-digit hexadecimal advanced licensing key. **NOTE:** When available, the licensing key will display at the top of the **show running-config** command output.To see an example of this output, refer to Section 11.2.2.1.
slot *slot*	(Optional) Specifies a module to which the license will be bound.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If not specified, the license will be bound to all modules.

Example

This example shows how to use license key abcdefg123456789 to activate advanced routing features:

```
Matrix(rw)->set license advanced abcdefg123456789
```

2.2.4.2 show license

When available and activated, use this command to display your license key.

show license

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to display your license key information:

```
Matrix(rw)->show license
advanced abcdefg123456789
```

2.2.4.3 clear license

Use this command to clear license key settings.

clear license {**advanced** | **redundancy**} [**slot** *slot*]

Syntax Description

advanced	Clears the advanced routing license setting.
redundancy	Clears the management module redundancy license setting.
slot *slot*	(Optional) Specifies a module from which the license setting will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If not specified, the license settings will be cleared from all modules.

Example

This example shows how to clear advanced license key settings:

```
Matrix(rw)->clear license advanced
```

2.2.5 Configuring Power over Ethernet (PoE)

Important Notice

This section applies only to PoE-equipped Matrix devices. Consult the Installation Guide shipped with your product to determine if it is PoE-equipped.

Purpose

To review and set PoE parameters, including the power available to the chassis, the usage threshold for each module, whether or not SNMP trap messages will be sent when power status changes, and per-port PoE settings.

Commands

The commands used to review and set PoE port parameters are listed below and described in the associated section as shown.

- show inlinepower (Section 2.2.5.1)
- set inlinepower mode (Section 2.2.5.2)
- clear inlinepower mode (Section 2.2.5.3)
- set inlinepower available (Section 2.2.5.4)
- clear inlinepower available (Section 2.2.5.5)
- set inlinepower powertrap (Section 2.2.5.6)
- clear inlinepower powertrap (Section 2.2.5.7)
- set inlinepower assigned (Section 2.2.5.8)
- clear inlinepower assigned (Section 2.2.5.9)
- set inlinepower threshold (Section 2.2.5.10)
- clear inlinepower threshold (Section 2.2.5.11)
- set inlinepower management (Section 2.2.5.12)
- clear inlinepower management (Section 2.2.5.13)
- set inlinepower psetrap (Section 2.2.5.14)
- clear inlinepower psetrap (Section 2.2.5.15)
- show port inlinepower (Section 2.2.5.16)

- set port inlinepower (Section 2.2.5.17)
- clear port inlinepower (Section 2.2.5.18)

2.2.5.1 show inlinepower

Use this command to display device PoE properties.

show inlinepower

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display device PoE properties. In this case, only the modules in slots 2 and 3 are PoE modules, so their power configurations display:

```
Matrix(rw)->show inlinepower
Total Power Detected    : 1200 Watts
Total Power Available   : 1200 Watts (100% of Total Power Detected)
Total Power Assigned    : 0 Watts
Power Allocation Mode   : auto
Power Trap Status       : disabled
Power Redundancy Status : not redundant
Power Supply 1 Status   : installed and operating
Power Supply 2 Status   : not installed
Power Supply 3 Status   : not installed
Power Supply 4 Status   : not installed

Slot Oper   Power Power    Power     Class  Power Usage Usage PSE      Mgmt
     Status Limit Assigned Available Budget Usage       Trhld Trap     Mode
            (W)   (W)      (W)       (W)    (W)   (%)   (%)   Status
---- ------ ----- -------- --------- ------ ----- ----- ----- -------- --------
1    on     806   0        598       12           2     75    disabled class
2    on     806   0        599              5     1     75    disabled real-time
3                0
4                0
5                0
6                0
7                0
```

2.2.5.2 set inlinepower mode

Use this command to set the chassis power allocation mode.

set inlinepower mode {**auto** | **manual**}

Syntax Description

auto	Assigns automatic mode to chassis power allocation.
manual	Assigns manual mode to chassis power allocation. This setting allows the values configured with the **set inlinepower assigned** command (Section 2.2.5.8) to be applied to PoE modules.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the chassis power allocation mode to manual:

```
Matrix(rw)->set inlinepower mode manual
```

2.2.5.3 clear inlinepower mode

Use this command to reset chassis power allocation to the default mode of auto.

clear inlinepower mode

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the chassis power allocation mode to auto:

```
Matrix(rw)->clear inlinepower mode
```

2.2.5.4 set inlinepower available

Use this command to set the percentage of total power available that a chassis can withdraw from the total power detected.

set inlinepower available *max-percentage*

NOTE: If the total power wattage value set with the **set inlinepower assigned** command (Section 2.2.5.8) is greater that the maximum power percentage specified with this command, a warning will display. If the user opts to execute these parameters, a ratio of assigned power will be applied to each module. Refer to the **show inlinepower** output (Section 2.2.5.1) for a sample warning message.

Syntax Description

max-percentage	Specifies the percentage of maximum power available. Valid values are **0** - **100**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the maximum inline power available to the chassis to 70 percent:

```
Matrix(rw)->set inlinepower available 70
```

2.2.5.5 clear inlinepower available

Use this command to reset the percentage of the total power available to a chassis to the default value of 100.

clear inlinepower available

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the maximum inline power available to the chassis to 100 percent:

```
Matrix(rw)->clear inlinepower available
```

2.2.5.6 set inlinepower powertrap

Use this command to disable or enable the sending of an SNMP trap message whenever the status of the chassis PoE power supplies or the PoE system redundancy changes.

set inlinepower powertrap {**disable** | **enable**}

Syntax Description

disable | **enable**	Disables or enables a chassis power supplies trap messaging.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable a chassis power supplies trap:

```
Matrix(rw)->set inlinepower powertrap enable
```

2.2.5.7 clear inlinepower powertrap

Use this command to reset chassis power trap messaging back to the default state of disabled.

clear inlinepower powertrap

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset chassis power trap messaging to disabled:

```
Matrix(rw)->clear inlinepower powertrap
```

2.2.5.8 set inlinepower assigned

Use this command to manually assign Power Sourcing Equipment (PSE) power to a module in the chassis.

set inlinepower assigned *power-value slot-number*

NOTE: If the total power wattage value set with this command is greater that the maximum power percentage specified with the **set inlinepower available** command (Section 2.2.5.4), a warning will display. If the user opts to execute these parameters, a ratio of assigned power will be applied to each module. Refer to the **show inlinepower** output (Section 2.2.5.1) for a sample warning message.

Syntax Description

power-value	Specifies a power value in watts.
slot-number	Specifies a module slot location for the power assignment.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to assign 200 watts of power to the module in slot 1:

```
Matrix(rw)->set inlinepower assigned 200 1
```

2.2.5.9 clear inlinepower assigned

Use this command to clear the power value manually assigned to one or more modules.

clear inlinepower assigned [*slot-number*]

Syntax Description

slot-number	(Optional) Clears the power assignment from a specific module.

Command Defaults

If *slot-number* is not specified, power value assignments will be cleared from all modules.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear power assignments to all modules in the chassis:

```
Matrix(rw)->clear inlinepower assigned
```

2.2.5.10 set inlinepower threshold

Use this command to set the PoE usage threshold on a specified module.

set inlinepower threshold *usage-threshold module-number*

Syntax Description

usage-threshold	Specifies a PoE threshold as a percentage of total system power usage. Valid values are **1 - 99**.
module-number	Specifies the module on which to set the PoE threshold.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the PoE threshold to 50 on module 1:

```
Matrix(rw)->set inlinepower threshold 50 1
```

2.2.5.11 clear inlinepower threshold

Use this command to reset the PoE usage threshold on a specified module to the default value of 75 percent.

clear inlinepower threshold *module-number*

Syntax Description

module-number	Specifies the module on which to reset the PoE threshold.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the PoE threshold to 75 on module 1:

```
Matrix(rw)->clear inlinepower threshold 1
```

2.2.5.12 set inlinepower management

Use this command to set the PoE management mode on a specified module.

set inlinepower management {**realtime** | **class**} *module-number*

Syntax Description

realtime	Manages power based on the actual power consumption of the ports.
class	Manages power based on the IEEE 802.3af definition of the class upper limit, except classes 0 and 4, for which the actual power consumption is used.
module-number	Specifies the module on which to set the PoE management mode.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the PoE management mode to “class” on module 1:

```
Matrix(rw)->set inlinepower management class 1
```

2.2.5.13 clear inlinepower management

Use this command to reset the PoE management mode on a specified module back to the default setting of “realtime”.

clear inlinepower management *module-number*

Syntax Description

module-number	Specifies the module on which to reset the PoE management mode.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the PoE management mode to “realtime” on module 1:

```
Matrix(rw)->clear inlinepower management 1
```

2.2.5.14 set inlinepower psetrap

Use this command to enable or disable the sending of an SNMP trap message for a module whenever the status of its ports changes, or whenever the module's PoE usage threshold is crossed. The module's PoE usage threshold must be set using the **set inlinepower threshold** command as described in Section 2.2.5.10.

set inlinepower psetrap {**disable** | **enable**} *module-number*

Syntax Description

disable | **enable**	Disables or enables PoE trap messaging.
module-number	Specifies the module on which to disable or enable trap messaging.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable PoE trap messaging on module 1:

```
Matrix(rw)->set inlinepower psetrap enable 1
```

2.2.5.15 clear inlinepower psetrap

Use this command to reset PoE trap messaging for a module back to default state of disabled.

clear inlinepower psetrap *module-number*

Syntax Description

module-number	Specifies the module on which to clear PoE trap messaging.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset PoE trap messaging for module 1 to disabled:

```
Matrix(rw)->clear inlinepower psetrap 1
```

2.2.5.16 show port inlinepower

Use this command to display all ports supporting PoE.

show port inlinepower [*port-string*]

Syntax Description

port-string	(Optional) Displays information for specific PoE port(s).

Command Defaults

If not specified, information for all PoE ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display PoE information for Fast Ethernet ports 11, 12 and 13 in module 1:

```
Matrix(rw)->show port inlinepower fe.1.1-2
                      Oper             Admin                    Power Power PD
Port    Type          Status           Status Priority Class Limit Usage Type
        (truncated)                                            (mW)  (mW)
------- ------------- ---------------- ------ -------- ----- ----- ----- ------
fe.1.11 Wireless 1    delivering power auto   critical 0     16800 7500  legacy
fe.1.12 Wireless 2    delivering power auto   high     1     16800 7500  802.3af
fe.1.13 Wireless 3    searching        auto   low      3     16800 7500  other
```

2.2.5.17 set port inlinepower

Use this command to configure PoE parameters on one or more ports.

set port inlinepower *port-string* {[**admin** {**off** | **auto**}] [**priority** {**critical** | **high** | **low**}] [**type** *type*] [**powerlimit** *powerlimit*]}

Syntax Description

port-string	Specifies the port(s) on which to configure PoE.
admin off | **auto**	Sets the PoE administrative state to off (disabled) or auto (on).
priority critical | **high** | **low**	Sets the port(s) priority for the PoE allocation algorithm to critical (highest), high or low.
type *type*	Specifies a string describing the type of device connected to a port.
powerlimit *powerlimit*	Sets the maximum power allowed on this port in megawatts. Valid values are 0 - 15400.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable PoE on port fe.3.1 with critical priority:

```
Matrix(rw)->set port inlinepower fe.3.1 admin auto priority critical
```

2.2.5.18 clear port inlinepower

Use this command to reset PoE parameters on one or more ports to default values.

clear port inlinepower *port-string* {[**admin**] [**priority**] [**type**] [**powerlimit**]}

Syntax Description

port-string	Specifies the port(s) on which to reset PoE.
admin	Resets the PoE administrative state to **auto** (on).
priority	Resets the port(s) priority for the PoE allocation algorithm to **low**.
type	Resets the port type to an empty string.
powerlimit	Resets the maximum power to 15400 megawatts.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to rest the PoE priority on port fe.3.1 to low:

```
Matrix(rw)->clear port inlinepower fe.3.1 priority
```

2.2.6 Downloading a New Firmware Image

You can upgrade the operational firmware in the Matrix Series device without physically opening the device or being in the same location. There are three ways to download firmware to the device:

- Via FTP download. This procedure uses an FTP server connected to the network and downloads the firmware using the FTP protocol. It is the most robust downloading mechanism. For details on how to perform an FTP download using the **copy** command, refer to Section 2.2.9.5.
- Via TFTP download. This procedure uses a TFTP server connected to the network and downloads the firmware using the TFTP protocol. For details on how to perform a TFTP download using the **copy** command, refer to Section 2.2.9.5.
- Via the serial (console) port. This procedure is an out-of-band operation that copies the firmware through the serial port to the device. It takes approximately five minutes and requires minimal configuration. It should be used in cases when you cannot connect the device to perform the in-band **copy** download procedure via FTP or TFTP. Serial console download has been successfully tested with the following applications:
  - HyperTerminal Copyright 1999
  - Tera Term Pro Version 2.3

Any other terminal applications may work but are not explicitly supported. For details, refer to Section 2.2.6.2.

Important Notice

The Matrix Series device allows you to download and store multiple image files. This feature is useful for reverting back to a previous version in the event that a firmware upgrade fails to boot successfully. After downloading firmware as described above, you can select which image file you want the device to load at startup using the **setboot** command in the System Image Loader menu (Section 2.2.6.2) or the **set boot system** command (Section 2.2.7.2).

2.2.6.1 Downloading from an FTP or TFTP Server

To perform an FTP or TFTP download, proceed as follows:

1. If you have not already done so, set the device's IP address using the **set ip address** command as detailed in Section 2.2.3.2.
2. Download a new image file using the **copy** command as detailed in Section 2.2.9.5.

You can now set the device to load the new image file at startup using the **set boot system** command as described in Section 2.2.7.2.

2.2.6.2 Downloading via the Serial Port

To download device firmware via the serial (console) port, proceed as follows:

1. With the console port connected, power up the device. The following message displays:

```
Boot ROM Initialization, Version 01.00.01

Copyright (c) 2004 Enterasys Networks, Inc.

SDRAM size: 128 MB
Testing SDRAM....                       PASSED.
Loading Boot Image: 01.00.02...         DONE.

Uncompressing Boot Image...             DONE.

Press any key to enter System Image Loader menu
```

2. Before the boot up completes, press any key. The following boot menu options screen displays.

```
Options available
1  - Start operational code
2  - Change baud rate
3  - Retrieve event log using XMODEM (64KB).
4  - Load new operational code using XMODEM
5  - Display operational code vital product data
6  - Run Flash Diagnostics
7  - Update Boot Code
8  - Delete operational code
9  - Reset the system
10 - Restore Configuration to factory defaults (delete config files)
```

3. Type **2**. The following baud rate selection screen displays:

```
1 - 1200
2 - 2400
3 - 4800
4 - 9600
5 - 19200
6 - 38400
7 - 57600
8 - 115200
0 - no change
```

4. Type **8** to set the device baud rate to 115200. The following message displays:

```
Setting baud rate to 115200, you must change your terminal baud rate.
```

5. Set the terminal baud rate to **115200** and press ENTER.

6. Type **download** to start the ZMODEM receive process.

7. Send the image file using the ZMODEM protocol from your terminal application. (This procedure will vary depending on your application.) When the ZMODEM download is finished, the following message displays:

```
[System Image Loader]: download
Preparing to receive file...

Writing file...
Download successful.
[System Image Loader]:
```

8. Set the device baud rate back to **9600.**

9. Set the terminal baud rate back to **9600** and press ENTER.

10. Type **setboot** *filename* to set the device to boot to the new firmware image. In this example, the downloaded image file is named “myimage.” The following message displays:

```
[System Image Loader]: setboot myimage
Image boot file set to myimage
[System Image Loader]:
```

11. Type **boot** to reboot the device. The following message indicates the downloaded image booted successfully:

```
[System Image Loader]: boot
/flash0/  - Volume is OK
Loading myimage...                    DONE.
```

NOTE: If you reboot without specifying the image to boot with **setboot** as described above, the device will attempt to load whatever image is currently stored in the bootstring via the **set boot system** command (Section 2.2.7.2). If the device cannot find the image, or it is not set, it will search through available images and attempt to boot the newest one. It will then set the bootstring to whatever image file name was successfully loaded.

2.2.7 Reviewing and Selecting a Boot Firmware Image

Purpose

To display and set the image file the device loads at startup.

Commands

The commands used to review and select the device's boot image file are listed below and described in the associated section as shown.

- show boot system (Section 2.2.7.1)
- set boot system (Section 2.2.7.2)

2.2.7.1 show boot system

Use this command to display the firmware image the system will load at the next system reset. The system must be reset by software for the new boot image to take effect at startup. If the chassis is powered OFF and then back ON, the current active image will just reload at startup.

The **dir** command, as described in Section 2.2.9.1, displays additional information about boot image files. "Active" indicates the image that is currently running, and "Boot" means indicates the image that is currently scheduled to boot next. The **set boot system** command (Section 2.2.7.2) will move the boot designation from the current running image, but will allow the active image to stay where it is until after the reset, when that image has actually been booted.

show boot system

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the switch's boot firmware image:

```
Matrix(rw)->show boot system
Current system image to boot: bootfile
```

2.2.7.2 set boot system

Use this command to set the firmware image the switch loads at startup. This is the image that will be loaded automatically after the system has been reset. Although it is not necessary to choose to reset the system and activate the new boot image immediately, the CLI will prompt you whether or not you want to do so. You can choose "Yes" at the question prompt to have the system reset and load the new boot image immediately, or choose "No" to load the new boot image at a later scheduled time by issuing one of the following commands: **clear config**, **reset**, or **configure**. The new boot setting will be remembered through resets and power downs, and will not take effect until the **clear config**, **reset**, or **configure** command is given.

set boot system *filename*

Syntax Description

filename	Specifies the name of the firmware image file.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the boot firmware image file to "newimage" and reset the system with the new image loaded immediately:

```
Matrix(rw)->set boot system newimage
This command can optionally reset the system to boot the new image.
Do you want to reset now (y/n) [n]?y
Resetting system ...
```

2.2.8 Starting and Configuring Telnet

Purpose

To enable or disable Telnet, and to start a Telnet session to a remote host. The Matrix Series device allows a total of four inbound and / or outbound Telnet session to run simultaneously.

Commands

The commands used to enable, start and configure Telnet are listed below and described in the associated section as shown.

- show telnet (Section 2.2.8.1)
- set telnet (Section 2.2.8.2)
- telnet (Section 2.2.8.3)
- show router telnet (Section 2.2.8.4)
- set router telnet (Section 2.2.8.5)
- clear router telnet (Section 2.2.8.6)

2.2.8.1 show telnet

Use this command to display the status of Telnet on the device.

show telnet

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display Telnet status:

```
Matrix(rw)->show telnet
Telnet inbound is currently: ENABLED
Telnet outbound is currently: ENABLED
```

2.2.8.2 set telnet

Use this command to enable or disable Telnet on the device.

set telnet {**enable** | **disable**} {**inbound** | **outbound** | **all**}

Syntax Description

enable | disable	Enables or disables Telnet services.
inbound | **outbound** | **all**	Specifies inbound service (the ability to Telnet to this device), outbound service (the ability to Telnet to other devices), or all (both inbound and outbound).

Command Defaults

None.

Command Mode

Read-Write.

Example

This example shows how to disable inbound and outbound Telnet services:

```
Matrix(rw)->set telnet disable all
Disconnect all telnet sessions and disable now (y/n)? [n]: y
All telnet sessions have been terminated, telnet is now disabled.
```

2.2.8.3 telnet

Use this command to start a Telnet connection to a remote host. The Matrix Series device allows a total of four inbound and / or outbound Telnet session to run simultaneously.

telnet *host* [*port*]

Syntax Description

host	Specifies the name or IP address of the remote host.
port	(Optional) Specifies the server port number.

Command Defaults

If not specified, the default *port* number 23 will be used.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to start a Telnet session to a host at 10.21.42.13:

```
Matrix(rw)->telnet 10.21.42.13
```

2.2.8.4 show router telnet

Use this command to display the state of Telnet service to the router.

show router telnet

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the state of Telnet service to the router:

```
Matrix(rw)->show router telnet
Telnet to Router IP is enabled
```

2.2.8.5 set router telnet

Use this command to enable or disable Telnet service to the router interface IP address.

set router telnet {**enable** | **disable**}

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable Telnet service to the router:

```
Matrix(rw)->set router telnet disable
```

2.2.8.6 clear router telnet

Use this command to reset Telnet service to the router to the default state of disabled.

clear router telnet

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset Telnet service to the router to disabled:

```
Matrix(rw)->clear router telnet
```

2.2.9 Managing Configuration and Image Files

Matrix Series devices provide a single configuration interface which allows you to perform both switch and router configuration with the same command set. The device also provides redundant, distributed copies of each image file in the event that DFE modules are added or removed from the Matrix chassis. When managing configuration and image files on the Matrix Series device, it is important to remember the following considerations:

- All modules will have the same image files loaded. If a module is inserted into a chassis, any images unique to that module will be deleted, and any images not on that module will be copied to it.
- Configuration files are stored per slot, with each slot in the chassis carrying unique files with it and not inheriting files.

The Matrix Series devices now support a script feature that allows you to execute a previously created script file containing CLI commands, and at the time of execution, enter optional arguments that modify the actions of the commands. This feature is intended to simplify the configuration of ports and VLANs, by creating script files containing groups of commands that you want to run on the same port-string or VLAN id. At the time of execution, you pass in the port-string, VLAN id, and any other required arguments that you want the commands to operate on. Refer to the **script** command, Section 2.2.9.7.

The following section describes the command set for managing both switch and router configuration.

For details on performing a basic routing configuration (while operating in router mode), refer to Section 11.2.3.

For details on downloading a new firmware image, refer to Section 2.2.6.

For details on reviewing and selecting the boot firmware image, refer to Section 2.2.7.

NOTE: The commands described in this section manage both switch and router configuration parameters, but must be executed from the switch CLI.

Purpose

To view, manage, and execute configuration and image files.

Commands

The commands used to view, manage, and execute configuration and image files are listed below and described in the associated section as shown.

- dir (Section 2.2.9.1)
- show file (Section 2.2.9.2)
- show config (Section 2.2.9.3)
- configure (Section 2.2.9.4)
- copy (Section 2.2.9.5)
- delete (Section 2.2.9.6)
- script (Section 2.2.9.7)

2.2.9.1 dir

Use this command to list files stored in the file system.

dir [*filename*]

Syntax Description

filename	(Optional) Specifies the file name or directory to list.

Command Type

Switch.

Command Mode

Read-Only.

Command Defaults

If *filename* is not specified, all files in the system will be displayed.

Example

This example shows how to list all the files in the system:

```
Matrix(rw)->dir
Images:
=========================================================
Filename:       ets-mtxe7-msi
Version:        01.02.00
Size:           3263043 (bytes)
Date:           MON FEB 24 14:07:08 2003
CheckSum:       6a2398391ba885531f96f19e161b096b
Location:       slot3, slot4, slot5, slot6
Compatibility: 4H4282-49, 4H4283-49, 4H4203-72

Filename:       01_02_00 (Active) (Boot)
Version:        01.03.00
Size:           3293059 (bytes)
Date:           TUE MAR 04 06:18:22 2003
CheckSum:       77481f78b8963675e1ed48e5a0085513
Location:       slot3, slot4, slot5, slot6
Compatibility: 4H4282-49, 4H4283-49, 4H4203-72

Files:
=====================================================
slot3:

slot4:

slot5:
FEB 24 2003  15:25:24            7060 sample.cfg

slot6:
```

Table 2-8 provides an explanation of the command output.

Table 2-8 dir Output Details

Output	What It Displays...
Images	Lists all the images resident in the chassis and information about each.
Filename	Name of the image file stored in the local file system. Various flags may be listed after the filename, including: • (active) - Indicates this image is currently running. • (boot) - Indicates this image is selected to boot on the next reset.

Table 2-8 dir Output Details (Continued)

Output	What It Displays...
Version	Firmware version of the image.
Size	Size of image file in the local file system.
Date	Date of image file in the local file system.
CheckSum	MD5 checksum calculated across the entire image file, used for image identity and verification.
Location	Modules on which this image resides. The system automatically mirrors all images to all other compatible modules in the system. A user cannot selectively add or remove images from individual modules while they reside in the same chassis.
Compatibility	Module types on which this image is qualified to run. Attempting to run an incompatible image on a given module will not succeed.
Files	User maintained files, such as CLI configuration files. For details on working with configuration files, refer to **show config** (Section 2.2.9.3) and **configure** (Section 2.2.9.4.)
SlotN	Lists user maintained files by slot location.

2.2.9.2 show file

Use this command to display the contents of an image or configuration file.

show file *filename*

Syntax Description

filename	Specifies the filename to display.

Command Type

Switch.

Command Mode

Read-Only.

Command Defaults

None.

Example

This example (an excerpt of the complete output) shows how to display the contents of the sample.cfg configuration file:

```
Matrix(rw)->show file slot4/sample.cfg
begin
!
# ***** NON-DEFAULT CONFIGURATION *****
!
!
!
#  SLOT   TYPE
#  ___    ________________
!
#   1     4H4282-49
#   2     4H4282-49
#   3     4H4282-49
#   4
#   5
#   6
#   7
!
!
# Router instance 3 Configuration
begin router 3

set router 3
router 3

enable
config t
write file
exit
disable
exit
end router 3

# arp
!
# cdp
!
# console
!
```

2.2.9.3 show config

Use this command to display the system configuration or write the configuration to a file.

show config [**all**] [*facility*] [**outfile** *outfile*]

Syntax Description

all	(Optional) Displays default and non-default configuration settings.
facility	(Optional) Displays the configuration for a specific facility.
outfile *outfile*	(Optional) Specifies a file in which to store the configuration.

Command Type

Switch.

Command Mode

Read-Write.

Command Defaults

If no parameters are specified, only non-default system configuration settings will be displayed.

Example

This example shows how to display the current non-default device configuration:

```
Matrix(rw)->show config
This command shows non-default configurations only.
Use 'show config all' to show both default and non-default
configurations.
........
..
begin
!
# ***** NON-DEFAULT CONFIGURATION *****
!
!
# cli
!
# console
!
# length
!
# logging
!
# port
set port disable fe.1.2-6
set port duplex fe.1.16 half
set port negotiation fe.2.1 disable
set port vlan fe.1.5 8
!
# system
set system location Office
end
```

2.2.9.4 configure

Use this command to execute a previously downloaded configuration file stored on the device.

configure *filename* [**append**]

Syntax Description

filename	Specifies the path and file name of the configuration file to execute.
append	(Optional) Executes the configuration as an appendage to the current configuration. This is equivalent to typing the contents of the config file directly into the CLI and can be used, for example, to make incremental adjustments to the current configuration.

Command Type

Switch.

Command Mode

Read-Write.

Command Defaults

If **append** is not specified, the current running configuration will be replaced with the contents of the configuration file, which will require an automated reset of the chassis.

Example

This example shows how to execute the “myconfig” file in the module in slot 1:

```
Matrix(rw)->configure slot1/myconfig
```

2.2.9.5 copy

Use this command to upload or download an image or a CLI configuration file.

copy *source destination*

NOTE: The Matrix module to which a configuration file is downloaded must have the same hardware configuration as the Matrix module from which it was uploaded.

Syntax Description

source	Specifies location and name of the source file to copy. Options are a local file path (valid directories are /images and /slotN), or the URL of an FTP or TFTP server.
destination	Specifies location and name of the destination where the file will be copied. Options are a slot location and file name, or the URL of an FTP or TFTP server.

Command Type

Switch.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to download an image via TFTP:

```
Matrix(rw)->copy tftp://134.141.89.34/ets-mtxe7-msi newimage
```

This example shows how to download an image via Anonymous FTP:

```
Matrix(rw)->copy ftp://134.141.89.34/ets-mtxe7-msi newimage
```

This example shows how to download an image via FTP with user credentials:

```
Matrix(rw)->copy ftp://user:passwd@134.141.89.34/ets-mtxe7-msi newimage
```

This example shows how to download a configuration file via TFTP to the slot 3 directory:

```
Matrix(rw)->copy tftp://134.141.89.34/myconfig slot3/myconfig
```

This example shows how to upload a configuration file via Anonymous FTP from the module in slot 3:

```
Matrix(rw)->copy slot3/myconfig ftp://134.141.89.34/myconfig
```

This example shows how to copy a configuration file from the slot 3 directory to the slot 5 directory:

```
Matrix(rw)->copy slot3/myconfig slot5/myconfig
```

2.2.9.6 delete

Use this command to remove an image or a CLI configuration file from the Matrix system.

delete *filename*

NOTE: Use the **show config** command as described in Section 2.2.9.3 to display current image and configuration file names.

Syntax Description

filename	Specifies the local path name to the file. Valid directories are /images and /slotN.

Command Type

Switch.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to delete the “myconfig” configuration file from slot 3:

```
Matrix(rw)->delete slot3/myconfig
```

This example shows how to delete the “010300” image file:

```
Matrix(rw)->delete images/010300
```

2.2.9.7 script

Use this command to execute a script file. The script file must first be created on a PC and copied to the Matrix device using the **copy** command (Section 2.2.9.5) before the script can be executed. The file can contain any number of switch commands, up to a maximum file size of 128 kilobytes. Router commands cannot be included in the file. Scripts cannot be nested within the file. Note that the **history** command will not reflect the execution of commands within a script file.

script *filename* [*arg1*] [*arg2*] [*arg3*] [*arg4*] [*arg5*] [*arg6*] [*arg7*]

Syntax Description

filename	Specifies the local path name to the file. Valid directories are /images and /slotN.
arg1 through *arg7*	Specifies up to seven arguments to the script.

Command Type

Switch.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example uses the **copy** command to copy the script file named "setport.scr" from IP address 10.1.221.3 to slot 4. Next, the contents of the file is displayed with the **show file** command. The script file requires two arguments, a port string (%1) and a VLAN id (%2). Finally, the script is executed, by specifying fe.1.1 as the first argument and 100 as the second argument.

```
Matrix(rw)->copy tftp://10.1.221.3/setport.scr slot4/setport.scr

Matrix(rw)->show file slot4/setport.scr
set port alias %1 script_set_port
set port vlan %1 %2 modify-egress
set port jumbo enable %1
set port disable %1
set port lacp port %1 disable

Matrix(rw)->script slot4/setport.scr fe.1.1 100
```

When the **script** command parses the file and performs the command line argument substitution, the commands are converted to the following:

```
set port alias fe.1.1 script_set_port
set port vlan fe.1.1 100 modify-egress
set port jumbo enable fe.1.1
set port disable fe.1.1
set port lacp port fe.1.1 disabled
```

The converted strings are then executed by the CLI engine and the **script** command returns.

2.2.10 Configuring CDP and Cisco Discovery Protocol

Purpose

To enable and configure the Enterasys (CDP) and Cisco Discovery Protocol. These protocols are used to discover network topology. When enabled, they allow Enterasys and Cisco devices to send periodic PDUs about themselves to neighboring devices. The Cisco Discovery Protocol is also used to manage the Cisco module of the Convergence End Points (CEP) IP phone detection function described in Section 13.3.8

Commands

The commands used to review and configure the CDP discovery protocol are listed below and described in the associated section as shown.

- show neighbors (Section 2.2.10.1)
- show cdp (Section 2.2.10.2)
- set cdp state (Section 2.2.10.3)
- set cdp auth (Section 2.2.10.4)
- set cdp interval (Section 2.2.10.5)
- set cdp hold-time (Section 2.2.10.6)
- clear cdp (Section 2.2.10.7)
- show ciscodp (Section 2.2.10.8)
- show ciscodp port info (Section 2.2.10.9)
- set ciscodp status (Section 2.2.10.10)
- set ciscodp timer (Section 2.2.10.11)
- set ciscodp holdtimer (Section 2.2.10.12)
- set ciscodp port (Section 2.2.10.13)
- clear ciscodp (Section 2.2.10.14)

2.2.10.1 show neighbors

Use this command to display Network Neighbor Discovery information from either CDP or Cisco Discovery Porotocol.

show neighbors [*port-string*]

Syntax Description

port-string	(Optional) Displays Network Neighbor Discovery information for a specific port. For a detailed description of possible port-string values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, all Network Neighbor Discovery information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display Network Neighbor Discovery information:

```
Matrix(rw)->show neighbors

 Port       Device ID            Port ID              Type    Network Address
-------------------------------------------------------------------------------
fe.1.3     00-01-f4-27-cd-69    10.1.26.153          cdp     10.1.26.153

fe.1.12    00-e0-63-14-e1-e6    10.1.26.24           cdp     10.1.26.24

fe.1.46    0001f40070b6         192.168.100.112      ciscodp 192.168.100.112

fe.1.46    00-01-f4-46-d8-c0    130.10.0.48          cdp     0.0.0.0

fe.1.48    0001f4007f4a         192.168.1.9          ciscodp 192.168.1.9
```

2.2.10.2 show cdp

Use this command to display the status of the CDP discovery protocol and message interval on one or more ports.

show cdp [*port-string*]

Syntax Description

port-string	(Optional) Displays CDP status for a specific port. For a detailed description of possible port-string values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, all CDP information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display CDP information for ports fe.1.1 through fe.1.9:

```
Matrix(rw)->show cdp fe.1.1-9
CDP Global Status         : enabled
CDP Versions Supported    : 0x0 0x38
CDP Hold Time             : 180
CDP Authentication Code   : 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0x0 0
x0 0x0 0x0
CDP Transmit Frequency    : 60

Port        Status
-----------------
fe.1.1      auto-enable
fe.1.2      auto-enable
fe.1.3      auto-enable
fe.1.4      auto-enable
fe.1.5      auto-enable
fe.1.6      auto-enable
fe.1.7      auto-enable
fe.1.8      auto-enable
fe.1.9      auto-enable
```

Table 2-9 provides an explanation of the command output.

Table 2-9 show cdp Output Details

Output	What It Displays...
CDP Global Status	Whether CDP is globally auto-enabled, enabled or disabled. The default state of auto-enabled can be reset with the **set cdp state** command. For details, refer to Section 2.2.10.3.
CDP Versions Supported	CDP version number(s) supported by the device.
CDP Hold Time	Minimum time interval (in seconds) at which CDP configuration messages can be set. The default of 180 seconds can be reset with the **set cdp hold-time** command. For details, refer to Section 2.2.10.6.
CDP Authentication Code	Authentication code for CDP discovery protocol. The default of 00-00-00-00-00-00-00-00 can be reset using the **set cdp auth** command. For details, refer to Section 2.2.10.4.
CDP Transmit Frequency	Frequency (in seconds) at which CDP messages can be transmitted. The default of 60 seconds can be reset with the **set cdp interval** command. For details, refer to Section 2.2.10.5.
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
Status	Whether CDP is enabled, disabled or auto-enabled on the port.

2.2.10.3 set cdp state

Use this command to enable or disable the CDP discovery protocol on one or more ports.

set cdp state {**auto** | **disable** | **enable**} [*port-string*]

Syntax Description

auto | **disable** | **enable**	Auto-enables, disables or enables the CDP protocol on the specified port(s). In auto-enable mode, which is the default mode for all ports, a port automatically becomes CDP-enabled upon receiving its first CDP message.
port-string	(Optional) Enables or disables CDP on specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1

Command Defaults

If *port-string* is not specified, the CDP state will be globally set.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to globally enable CDP:

```
Matrix(rw)->set cdp state enable
```

This example shows how to enable the CDP for port fe.1.2:

```
Matrix(rw)->set cdp state enable fe.1.2
```

This example shows how to disable the CDP for port fe.1.2:

```
Matrix(rw)->set cdp state disable fe.1.2
```

2.2.10.4 set cdp auth

Use this command to set a global CDP authentication code. This value determines a device's CDP domain. If two or more devices have the same CDP authentication code, they will be entered into each other's CDP neighbor tables. If they have different authentication codes, they are in different domains and will not be entered into each other's CDP neighbor tables.

A device with the default authentication code (16 null characters) will recognize all devices, no matter what their authentication code, and enter them into its CDP neighbor table.

set cdp auth *auth-code*

Syntax Description

auth-code	Specifies an authentication code for the CDP protocol. This can be up to 16 hexadecimal values separated by commas.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the CDP authentication code to 1,2,3,4,5,6,7,8:

```
Matrix(rw)->set cdp auth 1,2,3,4,5,6,7,8
```

2.2.10.5 set cdp interval

Use this command to set the message interval frequency (in seconds) of the CDP discovery protocol.

set cdp interval *frequency*

Syntax Description

frequency	Specifies the transmit frequency of CDP messages in seconds.Valid values are from **5** to **900** seconds.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the CDP interval frequency to 15 seconds:

```
Matrix(rw)->set cdp interval 15
```

2.2.10.6 set cdp hold-time

Use this command to set the hold time value for CDP discovery protocol configuration messages.

set cdp hold-time *hold-time*

Syntax Description

hold-time	Specifies the hold time value for CDP messages in seconds.Valid values are from **15 to 600**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set CDP hold time to 60 seconds:

```
Matrix(rw)->set cdp hold-time 60
```

2.2.10.7 clear cdp

Use this command to reset CDP discovery protocol settings to defaults.

clear cdp {[**state**] [**port-state** *port-string*] [**interval**] [**hold-time**] [**auth-code**]}

Syntax Description

state	(Optional) Resets the global CDP state to auto-enabled.
port-state *port-string*	(Optional) Resets the port state on specific port(s) to auto-enabled.
interval	(Optional) Resets the message frequency interval to **60** seconds.
hold-time	(Optional) Resets the hold time value to **180** seconds.
auth-code	(Optional) Resets the authentication code to 16 bytes of 00 (**00-00-00-00-00-00-00-00**).

Command Defaults

At least one optional parameter must be entered.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the CDP state to auto-enabled:

```
Matrix(rw)->clear cdp state
```

2.2.10.8 show ciscodp

Use this command to display global Cisco Discovery Protocol information.

show ciscodp

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display Cisco Discovery Protocol information. In this case, defaults have not been changed:

```
Matrix>show ciscodp
CiscoDP : Auto
Timer : 60
Holdtime (TTL) : 180
Device ID : 00E06314BD57
Last Change : WED FEB 08 01:07:45 2006
```

Table 2-10 provides an explanation of the command output.

Table 2-10 show ciscodp Output Details

Output	What It Displays...
CiscoDP	Whether Cisco Discovery Protocol is disabled or enabled globally. Auto indicates that Cisco DP will be globally enabled only if Cisco DP PDUs are received. Default setting of auto can be changed with the **set ciscodp status** command as described in Section 2.2.10.10.
Timer	Number of seconds between Cisco Discovery Protocol PDU transmissions. Default value of **60** can be changed with the s**et ciscodp timer** command as described in Section 2.2.10.11.
Holdtime (TTL)	Number of seconds neighboring devices will hold PDU transmissions from the sending device. Default value of **180** can be changed with the s**et ciscodp holdtime** command as described in Section 2.2.10.12.
Device ID	Sending device's serial number.

2.2.10.9 show ciscodp port info

Use this command to display summary information about the Cisco Discovery Protocol on one or more ports.

show ciscodp port info [*port-string*]

Syntax Description

port-string	(Optional) Displays information about specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, CiscoDP information will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display Cisco Discovery Protocol information for ports fe.1.1 through fe.1.5:

```
Matrix>(su)->show ciscodp port info fe.1.1-5
 port       state    vvid      trust      cos
-----------------------------------------------
fe.1.1     enabled   none     untrusted    0
fe.1.2     enabled   none     untrusted    0
fe.1.3     enabled   none     untrusted    0
fe.1.4     enabled   none     untrusted    0
fe.1.5     enabled   none     untrusted    1
```

Table 2-11 provides an explanation of the command output.

Table 2-11 show port ciscodp info Output Details

Output	What It Displays...
Port	Port designation.
State	Whether CiscoDP is enabled or disabled on this port. Default state of enabled can be changed using the **set ciscodp port** command (Section 2.2.10.13).
VVID	Whether a Voice VLAN ID has been set on this port. Default of none can changed using the **set ciscodp port** command (Section 2.2.10.13).
Trust	The trust mode of the port. Default of trusted can be changed using the **set ciscodp port** command (Section 2.2.10.13).
CoS	The Class of Service priority value for untrusted traffic. The default of 0 can be changed using the **set ciscodp port** command (Section 2.2.10.13).

2.2.10.10 set ciscodp status

Use this command to enable or disable Cisco Discovery Protocol globally on the device.

set ciscodp status {**auto | enable** | **disable**}

Syntax Description

auto	Globally enable only if CiscoDP PDUs are received
enable	Globally enables Cisco Discovery Protocol
disable	Globally disables Cisco Discovery Protocol

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable Cisco Discovery Protocol on the device:

```
Matrix>set ciscodp status enable
```

2.2.10.11 set ciscodp timer

Use this command to set the number of seconds between Cisco Discovery Protocol PDU transmissions.

set ciscodp time *time*

Syntax Description

time	Specifies the number of seconds between CiscoDP PDU transmissions. Valid values are **5** - **254**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the Cisco Discovery Protocol timer to 120 seconds:

```
Matrix>set ciscodp timer 120
```

2.2.10.12 set ciscodp holdtime

Use this command to set the time to live (TTL) for Cisco Discovery Protocol PDUs. This is the amount of time (in seconds) neighboring devices will hold PDU transmissions from the sending device.

set ciscodp holdtime *time*

Syntax Description

time	Specifies the time to live for CiscoDP PDUs. Valid values are **10 - 255**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the Cisco Discovery Protocol hold time to 180 seconds:

```
Matrix>set ciscodp holdtime 180
```

2.2.10.13 set ciscodp port

Use this command to set the status, voice VLAN, extended trust mode, and CoS priority for untrusted traffic for the Cisco Discovery Protocol on one or more ports.

The following points describe how the Cisco DP extended trust settings work on the Matrix device.

- A Cisco DP port trust status of trusted or untrusted is only meaningful when a Cisco IP phone is connected to a switch port and a PC or other device is connected to the back of the Cisco IP phone.
- A Cisco DP port state of trusted or untrusted only affects tagged traffic transmitted by the device connected to the Cisco IP phone. Untagged traffic transmitted by the device connected to the Cisco IP phone is unaffected by this setting.
- If the switch port is configured to a Cisco DP trust state of **trusted** (with the **trust-ext trusted** parameter of this command), this setting is communicated to the Cisco IP phone instructing it to allow the device connected to it to transmit traffic containing any CoS or Layer 2 802.1p marking.
- If the switch port is configured to a Cisco DP trust state of **untrusted**, this setting is communicated to the Cisco IP phone instructing it to overwrite the 802.1p tag of traffic transmitted by the device connected to it to 0, by default, or to the value specified by the **cos-ext** parameter of this command.
- There is a one-to-one correlation between the value set with the **cos-ext** parameter and the 802.1p value assigned to ingressed traffic by the Cisco IP phone. A value of 0 equates to an 802.1p priority of 0. Therefore, a value of 7 is given the highest priority.

set ciscodp port { [**status** {**disable** | **enable**}] [**vvid** {*<vlan-id>* | **none** | **dot1p** | **untagged**}] [**trust-ext** {**trusted** | **untrusted**}] [**cos-ext** *value*] } *<port-string>*

NOTE: The Cisco Discovery Protocol must be globally enabled using the **set ciscodp status** command as described in Section 2.2.10.10 before operational status can be set on individual ports.

Syntax Description

status	Set the CiscoDP port operational status
disable	Do not transmit or process CiscoDP PDUs
enable	Transmit and process CiscoDP PDUs
vvid	Set the port voice VLAN for CiscoDP PDU transmission
<vlan-id>	Specify the VLAN ID, range 1-4094.
none	No voice VLAN will be used in CiscoDP PDUs
dot1p	Instruct attached phone to send 802.1p tagged frames
untagged	Instruct attached phone to send untagged frames
trust-ext	Set the extended trust mode on the port.
trusted	Instruct attached phone to allow the device connected to it to transmit traffic containing any CoS or Layer 2 802.1p marking. This is the default value.
untrusted	Instruct attached phone to overwrite the 802.1p tag of traffic transmitted by the device connected to it to 0, by default, or to the value configured with the **cos-ext** parameter.
cos-ext *value*	Instruct attached phone to overwrite the 802.1p tag of traffic transmitted by the device connected to it with the specified *value*, when the trust mode of the port is set to untrusted. *Value* can range from 0 to 7, with 0 indicating the lowest priority.
port-string	Specifies the port(s) on which status will be set. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set the Cisco DP port voice VLAN ID to 3 on port fe.1.6 and enable the port operational state:

```
Matrix>set ciscodp port status enable vvid 3 fe.1.6
```

This example shows how to set the Cisco DP extended trust mode to untrusted on port fe.1.5 and set the CoS priority to 1:

```
Matrix>set ciscodp port trust-ext untrusted cos-ext 1 fe.1.5
```

2.2.10.14 clear ciscodp

Use this command to clear the Cisco Discovery Protocol back to the default values.

clear ciscodp { [**status** | **timer** | **holdtime** | **port** {**status** | **vvid** <*vlan-id*> | **trust-ext** | **cos-ext**}] } <*port-string*>

Syntax Description

status	Clear global CiscoDP enable status to default of auto.
timer	Clear the time between CiscoDP PDU transmissions to default of 60 seconds.
holdtime	Clear the time-to-live for CiscoDP PDU data to default of 180 seconds.
port	Clear the CiscoDP port configuration.
status	Clear the individual port operational status to the default of enabled.
vvid	Clear the individual port voice VLAN for CiscoDP PDU transmission to 0.
trust-ext	Clear the trust mode configuration of the port to trusted.
cos-ext	Clear the CoS priority for untrusted traffic of the port to 0.
port-string	Specifies the port(s) on which status will be set. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to clear all the Cisco DP parameters back to the default settings:

```
Matrix>clear ciscodp
```

This example shows how to clear the Cisco DP port status on port fe.1.5:

```
Matrix>clear ciscodp port status fe.1.5
```

2.2.11 Enabling or Disabling the Path MTU Discovery Protocol

Purpose

To enable or disable the path MTU (Maximum Transmission Unit) discovery protocol on the device. Because ports with transmission speeds higher than 100 Mbps are capable of transmitting frames up to a maximum of 10,239 bytes, it is necessary to have the path MTU discovery protocol enabled if jumbo frames are allowed in the network. If the system receives a frame larger than the destination port supports, it will send an "ICMP destination unreachable" error message indicating to the transmitting station that it must fragment the frame.

NOTE: By default, path MTU discovery is enabled on the device and jumbo frame support is disabled on all ports. When jumbo frame support is enabled with the **set port jumbo** command, as described in Section 3.3.5.2, path MTU discovery should not be disabled.

Commands

The commands used to disable or re-enable the path MTU discovery protocol are listed below and described in the associated sections as shown.

- show mtu (Section 2.2.11.1)
- set mtu (Section 2.2.11.2)
- clear mtu (Section 2.2.11.3)

2.2.11.1 show mtu

Use this command to display the status of the path MTU discovery protocol on the device.

show mtu

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display path MTU discovery status:

```
Matrix(rw)->show mtu
MTU discovery status: Enabled
```

2.2.11.2 set mtu

Use this command to disable or re-enable path MTU discovery protocol on the device.

set mtu {**enable** | **disable**}

Syntax Description

enable | disable	Enables or disables path MTU discovery protocol.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable path MTU discovery:

```
Matrix(rw)->set mtu disable
```

2.2.11.3 clear mtu

Use this command to reset the state of the path MTU discovery protocol back to enabled.

clear mtu

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the state of MTU discovery:

```
Matrix(rw)->clear mtu
```

2.2.12 Pausing, Clearing and Closing the CLI

Purpose

To clear the CLI screen or to close your CLI session.

Commands

The commands used to clear and close the CLI session are listed below and described in the associated sections as shown.

- cls (Section 2.2.12.1)
- exit | quit (Section 2.2.12.2)

2.2.12.1 cls (clear screen)

Use this command to clear the screen for the current CLI session.

cls

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to clear the CLI screen:

```
Matrix(rw)->cls
```

2.2.12.2 exit | quit

Use either of these commands to leave a CLI session.

exit

quit

NOTE: By default, device timeout occurs after 15 minutes of user inactivity, automatically closing your CLI session. Use the **set logout** command as described in Section 2.2.3.32 to change this default.

When operating in router mode, the **exit** command jumps to a lower configuration level. For details on enabling router configuration modes, refer to Section 2.3.3.

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to exit a CLI session:

```
Matrix(rw)->exit
```

2.2.13 Resetting the Device

Purpose

To reset one or more device modules, to clear the user-defined switch and router configuration parameters, or to schedule a system reset in order to load a new boot image.

Commands

The commands used to reset the device and clear the configuration are listed below and described in the associated sections as shown.

- show reset (Section 2.2.13.1)
- reset (Section 2.2.13.2)
- reset at (Section 2.2.13.3)
- reset in (Section 2.2.13.4)
- clear config (Section 2.2.13.5)

2.2.13.1 show reset

Use this command to display information about scheduled device resets.

show reset

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This command shows how to display reset information

```
Matrix(rw)->show reset

Reset scheduled for Fri Jan 21 2000, 23:00:00 (in 3 days 12 hours 56 minutes 57
seconds).
Reset reason: Software upgrade
```

2.2.13.2 reset

Use this command to reset the device without losing any user-defined configuration settings

reset {[*mod* | **system**] [**cancel**]}

NOTE: A Matrix Series device can also be reset with the RESET button located on its front panel. For information on how to do this, refer to the *Matrix Installation Guide* shipped with your device.

Syntax Description

mod	Specifies a module to be reset.
system	Resets the system.
cancel	Cancels a reset scheduled using the **reset at** command as described in Section 2.2.13.3, or the **reset in** command as described in Section 2.2.13.4.

Command Defaults

None.

Command Mode

Read-Write.

Examples

This example shows how to reset the system:

```
Matrix(rw)->reset
 This command will reset the system and may disconnect your telnet session.
 Do you want to continue (y/n) [n]? y

 Resetting...
```

This example shows how to cancel a scheduled system reset:

```
Matrix(rw)->reset cancel

Reset cancelled.
```

2.2.13.3 reset at

Use this command to schedule a system reset at a specific future time. This feature is useful for loading a new boot image.

reset at *hh:mm* [*mm/dd*] [*reason*]

Syntax Description

hh:mm	Schedules the hour and minute of the reset (using the 24-hour system).
mm/dd	(Optional) Schedules the month and day of the reset.
reason	(Optional) Specifies a reason for the reset.

Command Defaults

- If month and day are not specified, the reset will be scheduled for the first occurrence of the specified time.
- If a *reason* is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to schedule a reset at 8 p.m. on October 12:

```
Matrix(rw)->reset at 20:00 10/12
Reset scheduled at 20:00:00, Sat Oct 12 2002
Proceed with scheduled reset? (y/n) [n]? y
Reset scheduled for 20:00:00, Sat Oct 12 2002 (in 1 day 5 hours 40 minutes
```

This example shows how to schedule a reset at a specific future time and include a reason for the reset:

```
Matrix(rw)->reset at 20:00 10/12 Software upgrade to 6.1(1)
Reset scheduled at 20:00:00, Sat Oct 12 2002
Reset reason: Software upgrade to 6.1(1)
Proceed with scheduled reset? (y/n) [n]? y
Reset scheduled for 20:00:00, Sat Oct 12 2002 (in 1 day 5 hours 40 minutes
```

2.2.13.4 reset in

Use this command to schedule a system reset after a specific time. This feature is useful for loading a new boot image.

reset in *hh:mm* [*reason*]

Syntax Description

hh:mm	Specifies the number of hours and minutes into the future to perform a reset.
reason	(Optional) Specifies a reason for the reset

Command Defaults

If a *reason* is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to schedule a device reset in 5 hours and 20 minutes:

```
Matrix(rw)->reset in 5:20
Reset scheduled in 5 hours and 20 minutes
Proceed with scheduled reset? (y/n) [n]? y
Reset scheduled for 19:56:01, Wed March 15 2002 (in 5 hours 20 minutes
```

2.2.13.5 clear config

Use this command to clear the user-defined switch and router configuration parameters for one or more modules. Executing clear config on one Matrix module resets that module back to its factory defaults. If that module is in a chassis with other active modules, it will inherit system settings from the system. For a list of factory device default settings, refer to Section 2.1.1.

clear config *mod-num* | **all**

NOTE: This command will not affect the IP address.

Syntax Description

mod-num | **all**	Clears configuration parameters in a specific module or in all modules.

Command Defaults

None.

Command Mode

Read-Write.

Example

This example shows how to clear configuration parameters in all modules:

```
Matrix(rw)->clear config all
```

2.2.14 Gathering Technical Support Information

Purpose

To gather common technical support information.

Command

The command used to display technical support-related information is listed below and described in the associated section as shown.

- show support (Section 2.2.14.1)

2.2.14.1 show support

Use this command to display output for technical support-related commands.

show support [*filename*]

Syntax Description

filename	(Optional) Filename (slotN/name) to save output.

Command Defaults

The following commands are executed:

- show version (Section 2.2.3.25)
- show system hardware (Section 2.2.3.8)
- show vlan (Section 6.3.1.1)
- show vlan static (Section 6.3.1.1)
- show logging all (Section 10.2.1.1)
- show snmp counters (Section 4.3.1.2)
- show port status (Section 3.3.2.2)
- show spantree status (Section 5.2.1.1)
- show spantree blockedports (Section 5.2.2.9)
- show ip address (Section 2.2.3.1)
- show ip route (Section 10.2.5.6)
- show netstat (Section 10.2.2.4)
- show arp (Section 10.2.5.1)
- show system utilization (Section 2.2.3.9)
- show config (Section 2.2.9.3)

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to execute the **show support** command and save the results to slot 1 as a support3.txt file:

```
Matrix(su)->show support slot1/support3.txt
Writing output to file..................
Writing 'show config' output.....
Writing Message Log output.......
Matrix(su)->
```

There is no display example as the list of commands is quite lengthy. Click on the hyper-links in the “Command Defaults” section above, which contains a list of the individual commands executed, for more information and example outputs for the individual commands.

2.3 PREPARING THE DEVICE FOR ROUTER MODE

Important Notice

Startup and general configuration of the Matrix Series device must occur from the switch CLI. For details on how to start the device and configure general platform settings, refer to Section 2.1 and Section 2.2.1. Once startup and general device settings are complete, IP configuration and other router-specific commands can be executed when the device is in router mode. For details on how to enable router mode from the switch CLI, refer to Table 2-14 in Section 2.3.3.

2.3.1 Pre-Routing Configuration Tasks

The following pre-routing tasks, as detailed in Section 2.1 and Section 2.2.1, must be performed from the switch CLI.

- Starting up the CLI. (Section 2.1.6)
- Setting the system password. (Section 2.2.1.4)
- Configuring basic platform settings, such as host name, system clock, and terminal display settings. (Section 2.2.3)
- Setting the system IP address. (Section 2.2.3.2)
- Create and enable VLANs. (Chapter 6)
- File management tasks, including uploading or downloading flash or text configuration files, and displaying directory and file contents. (Section 2.2.9)
- Configuring at least one module (or the standalone device) device to run in router mode. (Section 2.3.2)

NOTES: The command prompts used as examples in Table 2-12 and throughout this guide show switch operation for a user in Read-Write (**rw**) access mode, and a system where module 1 and VLAN 1 have been configured for routing. The prompt changes depending on your current configuration mode, the specific Matrix device and module, and the interface types and numbers configured for routing on your system.

A module designation of 1 must be entered to enable routing on the Matrix NSA standalone device. All other values will result in an error message.

Table 2-12 Enabling the Switch for Routing

	To do this task...	Type this command...	At this prompt...	For details, see...
Step 1	Configure a routing module.	set router *module*	Switch: **Matrix (rw)->**	Section 2.3.2.2
Step 2	Enable router mode.	**router** *module*	Switch: **Matrix (rw)->**	Section 2.3.2.4
Step 3	Enable router Privileged EXEC mode.	enable	Router: **Matrix>Router1>**	Section 2.3.3
Step 4	Enable global router configuration mode.	**configure terminal**	Router: **Matrix>Router1#**	Section 2.3.3
Step 5	Enable interface configuration mode using the interface of the routing module.	**interface** {**vlan** *vlan-id* | **loopback** *loopback-id*	Router: **Matrix> Router1(config)#**	Section 11.2.1.2
Step 6	Assign an IP address to the routing interface.	**ip address** {*ip-address ip-mask*}	Router: **Matrix>Router1 (config-if (**Vlan 1 | Lpbk 1))#	Section 11.2.1.5
Step 7	Enable the interface for IP routing.	**no shutdown**	Router: **Matrix>Router (config-if (**Vlan 1 | Lpbk 1))#	Section 11.2.1.6

The example in Figure 2-8 shows how to:

- Configure module 1 as a routing module.
- Configure VLAN 1 on IP address 182.127.63.1 255.255.255.0 as the routing interface for that module.

Figure 2-8 Enabling the Switch for Routing

```
Matrix(rw)->set router 1
Matrix(rw)->router 1
Matrix>Router1>enable
Matrix>Router1#configure terminal
 Enter configuration commands:
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip address 182.127.63.1 255.255.255.0
Matrix>Router1(config-if(Vlan 1))#no shutdown
```

2.3.2 Reviewing and Configuring Routing Modules

Purpose

To review and configure routing on one or two modules.

Commands

The commands used to review and configure routing modules are listed below and described in the associated sections as shown.

- show router (Section 2.3.2.1)
- set router (Section 2.3.2.2)
- clear router (Section 2.3.2.3)
- router (Section 2.3.2.4)

2.3.2.1 show router

Use this command to display which modules are configured for routing.

show router

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to display which modules are configured for routing:

```
Matrix(rw)->show router
                Module  VID  IP Address       Mask
 ------------------------------------------------------------
RUNNING     :: 3      100   168.192.100.1    255.255.255.0
```

Table 2-13 provides an explanation of the command output.

Table 2-13 show router Output Details

Output	What It Displays...
Module	Number of the module configured for routing.
VID	VLAN ID of the first (lowest) routing interface.
IP Address	Module's IP address.
Mask	Module's IP mask.

2.3.2.2 set router

Use this command to configure routing on a module.

set router *module*

Syntax Description

module	Specifies the module to configure for routing. In the Matrix DFE-Gold Series chassis and N standalone devices, routing must be configured on module 1. If a redundancy license is available, routing redundancy must be configured on module 2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set module 1 as a routing module:

```
Matrix(rw)->set router 1
```

2.3.2.3 clear router

Use this command to disable routing on a module.

clear router *module*

Syntax Description

module	Specifies the routing module to disable for routing. Entering a value of **0** will disable all modules for routing.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set disable routing on module 1:

```
Matrix(rw)->clear router 1
```

2.3.2.4 router

Use this command to enable routing mode on a module. This must be a module previously configured for routing using the **set router** command as described in Section 2.3.2.2. Routing may be configured on one or two modules.

In the Matrix DFE-Gold Series chassis and N standalone devices, routing must be configured on module 1. If a redundancy license is available, routing redundancy must be configured on module 2.

router *module*

Syntax Description

module	Specifies the module on which to enable routing mode.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable routing on module 1:

```
Matrix(rw)->router 1
```

2.3.3 Enabling Router Configuration Modes

The Matrix CLI provides different modes of router operation for issuing a subset of commands from each mode. Table 2-14 describes these modes of operation.

NOTE: The command prompts used as examples in Table 2-14 and throughout this guide show switch operation for a user in Read-Write (**rw**) access mode, and a system where module 1 and VLAN 1 have been configured for routing. The prompt changes depending on your current configuration mode, the specific module, and the interface types and numbers configured for routing on your system.

Table 2-14 Router CLI Configuration Modes

Use this mode...	To...	Access method...	Resulting Prompt...
Privileged EXEC Mode	• Set system operating parameters • Show configuration parameters • Save/copy configurations	From the switch CLI: **1.** Type **router** *module* (using a module number configured for routing), then **2.** Type **enable**.	**Matrix>Router1>** **Matrix>Router1#**
Global Configuration Mode	Set system-wide parameters.	Type **configure terminal** from Privileged EXEC mode.	**Matrix>Router1(config)#**
Interface Configuration Mode	Configure router interfaces.	Type **interface vlan** or **interface loopback** and the interface's *id* from Global Configuration mode.	**Matrix>Router1 (config-if(Vlan 1** | Lpbk 1**))#**

Table 2-14 Router CLI Configuration Modes (Continued)

Use this mode...	To...	Access method...	Resulting Prompt...
Router Configuration Mode	Set IP protocol parameters.	Type **router** and the *protocol name* (and, for OSPF, the *instance ID*) from Global or Interface Configuration mode.	**Matrix>Router1 (config-router)#**
Key Chain Configuration Mode	Set protocol (RIP) authentication key parameters.	Type **key chain** and the key chain *name* from Router (RIP) Configuration mode.	Matrix>Router1 (config-keychain)#
Key Chain Key Configuration Mode	Configure a specific key within a RIP authentication key chain.	Type **key** and the *key-id* from Key Chain Configuration Mode.	Matrix>Router1 (config-keychain-key)#
Route Map Configuration Mode	Configure route maps 1-99.	Type **route-map**, an *id-number*, and **permit** or **deny** from Global Configuration Mode.	**Matrix>Router1 (config-route-map)#**
Policy-Based Routing Configuration Mode	Configure policy-based routing for route maps 100-199.	Type **route-map**, an *id-number*, and **permit** or **deny** from Global Configuration Mode.	**Matrix>Router1 (config-route-map-pbr)#**
Server Load Balancing (SLB) Server Farm Configuration Mode	Configure an LSNAT server farm.	Type **ip slb serverfarm** and the *serverfarmname* from Global Configuration Mode.	Matrix>Router1 (config-slb-sfarm)#

Table 2-14 Router CLI Configuration Modes (Continued)

Use this mode...	To...	Access method...	Resulting Prompt...
Server Load Balancing (SLB) Real Server Configuration Mode	Configure an LSNAT real server.	Type **real** and the real server *IP address* from SLB Server Farm Configuration Mode.	Matrix>Router1 (config-slb-real)#
Server Load Balancing (SLB) Virtual Server Configuration Mode	Configure an LSNAT virtual server.	Type **ip slb vserver** and the *vserver-name* from Global Configuration Mode.	Matrix>Router1 (config-slb-vserver)#
IP Local Pool Configuration Mode	Configure a local address pool as a DHCP subnet	Type **ip local pool** and the local pool *name* from Global Configuration Mode.	Matrix>Router1 (ip-local-pool)#
DHCP Pool Configuration Mode	Configure a DHCP server address pool.	Type **ip dhcp pool** and the address pool *name* from Global Configuration Mode.	Matrix>Router1 (config-dhcp-pool)#
DHCP Class Configuration Mode	Configure a DHCP client class.	Type **client-class** and the client class *name* from DHCP Pool or Host Configuration Mode.	Matrix>Router1 (config-dhcp-class)#

Table 2-14 Router CLI Configuration Modes (Continued)

Use this mode...	To...	Access method...	Resulting Prompt...
DHCP Host Configuration Mode	Configure DHCP host parameters.	Type **client-identifier** and the *identifier*, or **hardware-address** and an *address* from any DHCP configuration mode.	Matrix>Router1 (config-dhcp-host)#

NOTE: To jump to a lower configuration mode, type **exit** at the command prompt. To revert back to switch CLI, type **exit** from Privileged EXEC router mode.

3

Port Configuration

This chapter describes the Port Configuration set of commands and how to use them.

Important Notice

CLI examples in this guide illustrate a generic Matrix command prompt and chassis-based / modular port designations. Depending on which Matrix Series device you are using, your default command prompt and output may be different than the examples shown.

3.1 PORT CONFIGURATION SUMMARY

Console Port(s)

Each Matrix Series module or standalone device includes a console port through which local management of the device can be accessed using a terminal or modem.

For details on configuring one or more console port settings, refer back to Section 3.3.1.

For module placement rules and considerations for configuring local management on DFE-Gold modules, refer to the *Matrix DFE-Gold Series Installation Guide*.

For details on activating redundancy on a DFE-Gold Series module, refer to Section 2.2.4.

Switch Ports

The Matrix Series modules and standalone devices have fixed front panel switch ports and, depending on the model, optional expansion module slots. The numbering scheme used to identify the switch ports on the front panel and the expansion module(s) installed is interface-type dependent and is also dependent upon the chassis in which the module(s) are installed.

3.1.1 Port String Syntax Used in the CLI

Commands requiring a *port-string* parameter use the following syntax to designate port type, slot location, and port number:

port type.slot location.port number

Where **port type** can be:

fe for 100-Mbps Ethernet
ge for 1-Gbps Ethernet
tg for 10-Gbps Ethernet
com for COM (console) port
host for the host port
vlan for vlan interfaces
lag for IEEE802.3 link aggregation ports
lpbk for loopback interfaces, or
lo for the local (software loopback) interface

rtr for router interface

Slot location for modules installed in a Matrix N7 or E7 chassis can be:
0 through **7**, with **0** designating virtual system ports (lag, vlan, host, loopback), and **1** designating the left-most module slot in the chassis.

Slot location for modules installed in a Matrix N3 chassis can be:
0 through **3**, with **0** designating virtual system ports (lag, vlan, host, loopback), and **1** designating the lowest module slot in the chassis.

Port number can be:
Any port number in a slot location. The highest valid port number is dependent on the number of ports in a slot location and the port type.

For example:
If a module in slot 1 has 48, 100Mbps Fast Ethernet front panel ports, and an uplink interface with 6 Mini GBICs, the range of port number designations used in the CLI command would be:

fe.1.1 through **fe.1.48** for the 48 100Mbps Fast Ethernet front panel ports, and
ge.1.1 through **ge.1.6** for the 6 Mini GBIC uplink ports.

If the uplink has the same type (**fe**) ports as the front panel, the numbering continues with the port number **fe.1.49**.

Examples

NOTE: You can use a wildcard (*) to indicate all of an item. For example, fe.3.* would represent all 100Mbps Ethernet (fe) ports in the module in slot 3.

This example shows the *port-string* syntax for specifying the 100-Mbps Ethernet ports 1 through 10 in the module in chassis slot 1.

```
fe.1.1-10
```

This example shows the *port-string* syntax for specifying the 1-Gigabit Ethernet port 14 in the module in chassis slot 3.

```
ge.3.14
```

This example shows the *port-string* syntax for specifying Fast Ethernet ports 1 and 3 and Gigabit Ethernet port 11 in the module in chassis slot 1:

```
fe.1.1,fe.1.3;ge.1.11
```

This example shows the *port-string* syntax for specifying Fast Ethernet ports 1, 3, 7, 8, 9 and 10 in the module in chassis slot 1:

```
fe.1.1,fe.1.3,fe.1.7-10
```

This example shows the *port-string* syntax for specifying the 10-Gigabit Ethernet port 2 of the module in chassis slot 3.

```
tg.3.1
```

This example shows the *port-string* syntax for specifying all 1-Gigabit Ethernet ports in the module in chassis slot 3.

```
ge.3.*
```

This example shows the *port-string* syntax for specifying all 10-Gbps Ethernet ports in the chassis.

```
tg.*.*
```

This example shows the *port-string* syntax for specifying all ports (of any interface type) in all modules in the chassis

```
*.*.*
```

3.2 PROCESS OVERVIEW: PORT CONFIGURATION

Use the following steps as a guide to configuring console and switch ports on the device:

1. Reviewing and setting console port properties (Section 3.3.1)
2. Reviewing switch port status (Section 3.3.2)
3. Disabling / enabling and naming switch ports (Section 3.3.3)
4. Setting switch port speed and duplex mode (Section 3.3.4)
5. Enabling / disabling jumbo frame support (Section 3.3.5)
6. Setting auto negotiation and advertised ability (Section 3.3.6)
7. Setting flow control (Section 3.3.7)
8. Configuring link traps and link flap detection (Section 3.3.8)
9. Configuring broadcast suppression (Section 3.3.9)
10. Setting port mirroring (Section 3.4.3)
11. Configuring link aggregation (Section 3.5.4)

3.3 PORT CONFIGURATION COMMAND SET

3.3.1 Setting Console Port Properties

Purpose

To review and set parameters for one or more of the device's console ports, including baud rate, auto baud detection, stopbits and parity.

Commands

The commands used to review and configure console port settings are listed below and described in the associated section as shown.

- show console (Section 3.3.1.1)
- clear console (Section 3.3.1.2)
- show console baud (Section 3.3.1.3)
- set console baud (Section 3.3.1.4)
- clear console baud (Section 3.3.1.5)
- show console flowcontrol (Section 3.3.1.6)
- set console flowcontrol (Section 3.3.1.7)
- clear console flowcontrol (Section 3.3.1.8)
- show console bits (Section 3.3.1.9)
- set console bits (Section 3.3.1.10)
- clear console bits (Section 3.3.1.10)
- show console stopbits (Section 3.3.1.12)
- set console stopbits (Section 3.3.1.13)
- clear console stopbits (Section 3.3.1.14)
- show console parity (Section 3.3.1.15)
- set console parity (Section 3.3.1.16)
- clear console parity (Section 3.3.1.17)

3.3.1.1 show console

Use this command to display properties set for one or more console ports.

show console [*port-string*]

Syntax Description

port-string	(Optional) Displays properties for specific console port(s)

Command Defaults

If *port-string* is not specified, properties for all console ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display properties for console port com.1.1:

```
Matrix(rw)->show console com.1.1

Port          Baud    Flow    Bits  StopBits    Parity  Autobaud
------------  ------  ------  ----  ----------  ------  --------
com.1.1       38400   ctsrts  8     one         none    disable
```

3.3.1.2 clear console

Use this command to clear the properties set for one or more console ports.

clear console [*port-string*]

Syntax Description

port-string	(Optional) Clears properties for specific console port(s).

Command Defaults

If *port-string* is not specified, properties for all console ports will be cleared.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to clear properties for console port com.1.1:

```
Matrix(rw)->clear console com.1.1
```

3.3.1.3 show console baud

Use this command to display the baud rate for one or more console ports.

show console baud [*port-string*]

Syntax Description

port-string	(Optional) Displays baud rate for specific console port(s).

Command Defaults

If *port-string* is not specified, baud rate for all console ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the baud rate for console port com.1.1:

```
Matrix(rw)->show console baud com.1.1

Port           Baud
------------   --------
com.1.1        38400
```

3.3.1.4 set console baud

Use this command to set the baud rate for one or more console ports.

set console baud *rate* [*port-string*]

Syntax Description

rate	Sets the console baud rate. Valid values are: **300, 600**, **1200**, **2400**, **4800**, **5760**, **9600**, **14400**, **19200**, **38400**, and **115200**.
port-string	(Optional) Sets baud rate for specific port(s).

Command Defaults

If *port-string* is not specified, baud rate will be set for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the baud rate to 19200 on console port com.1.1:

```
Matrix(rw)->set console baud 19200 com.1.1
```

3.3.1.5 clear console baud

Use this command to clear the baud rate for one or more console ports.

clear console baud [*port-string*]

Syntax Description

port-string	(Optional) Clears baud rate for specific port(s).

Command Defaults

If *port-string* is not specified, baud rate will be cleared for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the baud rate on console port com.1.1:

```
Matrix(rw)->clear console baud com.1.1
```

3.3.1.6 show console flowcontrol

Use this command to display the type of flow control setting for one or more console ports.

show console flowcontrol [*port-string*]

Syntax Description

port-string	(Optional) Displays the flow control setting for specific console port(s).

Command Defaults

If *port-string* is not specified, the flow control setting for all console ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the flow control setting for console port com.1.1:

```
Matrix(rw)->show console flowcontrol com.1.1

Port           Flow
------------   --------
com.1.1        ctsrts
```

3.3.1.7 set console flowcontrol

Use this command to set the type of flow control for one or more console ports.

set console flowcontrol {**none** | **ctsrts** | **dsrdtr**} [*port-string*]

Syntax Description

none	Disables all hardware flow control.
ctsrts	Enables CTS/RTS (Clear to Send/Request to Send) hardware flow control.
dsrdtr	Enables DSR/DTR (Data Set Ready/Data Terminal Ready) hardware flow control.
port-string	(Optional) Sets flow control for specific console port(s).

Command Defaults

If *port-string* is not specified, flow control will be set for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable DSR/DTR flow control for console port com.1.1:

```
Matrix(rw)->set console flowcontrol dsrdtr com.1.1
```

3.3.1.8 clear console flowcontrol

Use this command to clear the type of flow control for one or more console ports.

clear console flowcontrol [*port-string*]

Syntax Description

port-string	(Optional) Clears flow control for specific console port(s).

Command Defaults

If *port-string* is not specified, flow control will be cleared for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear flow control for console port com.1.1:

```
Matrix(rw)->clear console flowcontrol com.1.1
```

3.3.1.9 show console bits

Use this command to display the number of bits per character set for one or more console ports.

show console bits [*port-string*]

Syntax Description

port-string	(Optional) Displays the bits per character setting for specific console port(s).

Command Defaults

If *port-string* is not specified, the bits per character setting for all console ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the bits per character setting for console port com.1.1:

```
Matrix(rw)->show console bits com.1.1
Port          Bits
------------  --------
com.1.1       8
```

3.3.1.10 set console bits

Use this command to set the number of bits per character for one or more console ports.

set console bits *num-bits* [*port-string*]

Syntax Description

num-bits	Specifies the number of bits per character. Valid values are **5**, **6**, **7**, and **8**.
port-string	(Optional) Sets bits per character for specific console port(s).

Command Defaults

If *port-string* is not specified, bits per character will be set for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set bits per character to 5 for console port com.1.1:

```
Matrix(rw)->set console bits 5 com.1.1
```

3.3.1.11 clear console bits

Use this command to clear the number of bits per character for one or more console ports.

clear console bits [*port-string*]

Syntax Description

port-string	(Optional) Clears bits per character for specific console port(s).

Command Defaults

If *port-string* is not specified, bits per character will be cleared for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear bits per character for console port com.1.1:

```
Matrix(rw)->clear console bits com.1.1
```

3.3.1.12 show console stopbits

Use this command to display the console port stop bits per character.

show console stopbits [*port-string*]

Syntax Description

port-string	(Optional) Displays stop bits for specific console port(s).

Command Defaults

If *port-string* is not specified, stop bits per character will be displayed for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to show stop bits per character on com.1.1:

```
Matrix(rw)->show console stopbits com.1.1
Port           StopBits
-------------  --------
com.1.1        one
```

3.3.1.13 set console stopbits

Use this command to set the stop bits per character for one or more console ports.

set console stopbits {**one** | **oneandhalf** | **two**} [*port-string*]

Syntax Description

one | **oneandhalf** | **two**	Sets stop bits per character to 1, 1.5 or 2.
port-string	(Optional) Sets stop bits for specific console port(s).

Command Defaults

If *port-string* is not specified, stop bits per character will be set for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set stop bits per character to 2 for console port com.1.1:

```
Matrix(rw)->set console stopbits 2 com.1.1
```

3.3.1.14 clear console stopbits

Use this command to clear the stop bits per character for one or more console ports.

clear console stopbits [*port-string*]

Syntax Description

port-string	(Optional) Clears stop bits for specific console port(s).

Command Defaults

If *port-string* is not specified, stop bits per character will be cleared for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear stop bits per character for console port com.1.1:

```
Matrix(rw)->clear console stopbits com.1.1
```

3.3.1.15 show console parity

Use this command to display the type of parity checking set for one or more console ports.

show console parity [*port-string*]

Syntax Description

port-string	(Optional) Displays parity type for specific console port(s).

Command Defaults

If *port-string* is not specified, parity type for all console ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display parity type for console port com.1.1:

```
Matrix(rw)->show console parity com.1.1

Port           Parity
------------   --------
com.1.1        none
```

3.3.1.16 set console parity

Use this command to set the parity type for one or more console ports.

set console parity {**none** | **odd** | **even** | **mark** | **space**} [*port-string*]

Syntax Description

none	Specifies that no parity checking will be performed.
odd	Enables odd parity checking.
even	Enables even parity checking.
mark	Enables mark parity checking.
space	Enables space parity checking.
port-string	(Optional) Sets parity type for specific console port(s).

Command Defaults

If *port-string* is not specified, parity type will be set for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable even parity checking on console port com.1.1:

```
Matrix(rw)->set console parity even com.1.1
```

3.3.1.17 clear console parity

Use this command to clear the parity type for one or more console ports.

clear console parity [*port-string*]

Syntax Description

port-string	(Optional) Clears the parity type for specific console port(s).

Command Defaults

If *port-string* is not specified, parity type will be cleared for all console ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear parity type on console port com.1.1:

```
Matrix(rw)->clear console parity com 1.1
```

3.3.2 Reviewing Port Status

Purpose

To display operating status, duplex mode, speed, port type, and statistical information about traffic received and transmitted through one or all switch ports on the device.

Commands

The commands used to review port status are listed below and described in the associated sections as shown.

- show port (Section 3.3.2.1)
- show port status (Section 3.3.2.2)
- show port counters (Section 3.3.2.3)
- show port operstatuscause (Section 3.3.2.4)
- clear port operstatuscause (Section 3.3.2.5)

3.3.2.1 show port

Use this command to display whether or not one or more ports are enabled for switching.

show port [*port-string*]

Syntax Description

port-string	(Optional) Displays operational status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, operational status information for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display operational status information for 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->show port ge.3.14
Port ge.3.14 enabled
```

3.3.2.2 show port status

Use this command to display operating and admin status, speed, duplex mode and port type for one or more ports on the device.

show port status [*port-string*] [**-interesting**]

Syntax Description

port-string	(Optional) Displays status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
-interesting	(Optional) Displays only ports with an operational status of up or dormant.

Command Defaults

If no options are specified, status information for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display status information for port ge.3.1 through 4:

```
Matrix(rw)->show port status ge.3.1-4

Port           Alias           Oper      Admin    Speed     Duplex   Type
               (truncated)      Status   Status
------------  --------------  -------  -------  --------  ------- -------------
ge.3.14                        up        up      1 Gbps    full    1000-SX MT-RJ
```

This example shows how to display status information for console ports:

```
Matrix(rw)->show port status com.*.*

Port           Alias           Oper     Admin     Speed     Duplex   Type
               (truncated)      Status   Status
------------  --------------  -------  -------  --------  -------  -------------
com.5.1                       up       up       38 Kbps            RS232   RJ45
com.7.1                       up       up       38 Kbps            RS232   RJ45
```

Table 3-1 provides an explanation of the command output.

Table 3-1 show port status Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
Alias (truncated)	Alias configured for the port. For details on using the **set port alias** command, refer to Section 3.3.3.3.
Oper Status	Operating status (up or down).
Admin Status	Whether the specified port is enabled (up) or disabled (down). For details on using the **set port disable** command to change the default port status of enabled, refer to Section 3.3.3.1. For details on using the **set port enable** command to re-enable ports, refer to Section 3.3.3.2.
Speed	Operational speed in Mbps or Kbps of the specified port. For details on using the **set port speed** command to change defaults, refer to Section 3.3.4.2.
Duplex	Duplex mode (half or full) of the specified port. For details on using the **set port duplex** command to change defaults, refer to Section 3.3.6.
Type	Physical port and interface type.

3.3.2.3 show port counters

Use this command to display port counter statistics detailing traffic through the device and through all MIB2 network devices.

show port counters [*port-string*] [**switch** | **mib2**]

Syntax Description

port-string	(Optional) Displays counter statistics for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
switch | **mib2**	(Optional) Displays switch or MIB2 statistics. Switch statistics detail performance of the Matrix switch device. MIB2 interface statistics detail performance of all network devices.

Command Defaults

- If *port-string* is not specified, counter statistics will be displayed for all ports.
- If **mib2** or **switch** are not specified, all counter statistics will be displayed for the specified port(s).

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display all counter statistics, including MIB2 network traffic and traffic through the device for fe.3.1:

```
Matrix(rw)->show port counters fe.3.1

Port: fe.3.1   MIB2 Interface: 1   Bridge Port: 2
No counter discontinuity time
-------------------------------------------------------------------

MIB2 Interface Counters
-----------------------
In Octets                          0
In Unicast Pkts                    0
In Multicast Pkts                  0
In Broadcast Pkts                  0
In Discards                        0
In Errors                          0
In Unknown Protocol                0
Out Octets                         0
Out Unicasts Pkts                  0
Out Multicast Pkts                 0
Out Broadcast Pkts                 0
Out Errors                         0
Out Queue Length                 256

802.1Q Switch Counters
----------------------
Frames Received                    0
Frames Transmitted                 0
Frames Filtered                    0
```

This example shows how to display all fe.3.1 port counter statistics related to traffic through the device.

```
Matrix(rw)->show port counters fe.3.1 switch

Port: fe.3.1   Bridge Port: 2
No counter discontinuity time
802.1Q Switch Counters
-----------------------------------------
Frames Received                          0
Frames Transmitted                       0
Frames Filtered                          0
```

Table 3-2 provides an explanation of the command output.

Table 3-2 show port counters Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
MIB2 Interface	MIB2 interface designation.
Bridge Port	IEEE 802.1D bridge port designation.
MIB2 Interface Counters	MIB2 network traffic counts
802.1Q Switch Counters	Counts of frames received, transmitted, and filtered.

3.3.2.4 show port operstatuscause

Use this command to display the causes configured to place operating status to a down or dormant state for one or more ports.

show port operstatuscause [*port-string*] [**any**] [**modifiable**][**admin**] [**linkloss**] [**linkflap**] [**self**] [**init**] [**flowlimit**] [**policy**] [**cos**] [**dot1x**] [**lag**]

Syntax Description

port-string	(Optional) Displays causes for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
any	(Optional) Displays a table of all causes.
modifiable	(Optional) Displays a table of modifiable causes.
admin	(Optional) Displays ports down due to adminStatus.
linkloss	(Optional) Displays ports down due to link loss.
linkflap	(Optional) Displays ports down due to link flap violation. For more information on configuring the link flap function, refer to Section 3.3.8.
self	(Optional) Displays ports down due to a hardware cause.
init	(Optional) Displays ports in initialization phase.
flowlimit	(Optional) Displays ports down due to a flow limiting constraint. For more information on configuring flow limiting, which is also known as flow setup throttling, refer to Section 13.3.15.
policy	(Optional) Displays ports down due to policy restriction. For more information on configuring user policies, refer to Chapter 7.
cos	(Optional) Displays ports down due to Class of Service constraint. For more information on configuring Class of Service, refer to Section 7.3.3.
dot1x	(Optional) Displays ports dormant due to 802.1X enforcement. For more information on configuring 802.1X, refer to Section 13.3.5.

lag	(Optional) Displays ports dormant due to Link Aggregation Group (LAG) membership. For more information on configuring LAG, refer to Section 3.3.8.

Command Defaults

If no options are specified, causes for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display operation status causes for ports ge.1.1 through 6. In this case, port ge.1.6 is down due to a link loss:

```
Matrix(rw)->show port operstatuscause ge.1.1-6
           +------------------------------+
           | A  L  L                 D    |
           | D  L  F  S  I  F        O    |
           | M  O  L  E  N  L  P  C  T  L |
           | I  S  A  L  I  O  O  O  1  A |
Port       | N  S  P  F  T  W  L  S  X  G |
-----------+------------------------------+
ge.1.1     | .  .  .  .  .  .  .  .  .  . |
ge.1.2     | .  .  .  .  .  .  .  .  .  . |
ge.1.3     | .  .  .  .  .  .  .  .  .  . |
ge.1.4     | .  .  .  .  .  .  .  .  .  . |
ge.1.5     | .  .  .  .  .  .  .  .  .  . |
ge.1.6     | .  X  .  .  .  .  .  .  .  . |
```

3.3.2.5 clear port operstatuscause

Use this command to override the causes configured to place operating status to a down or dormant state for one or more ports.

clear port operstatuscause [*port-string*] [**admin**] [**linkflap**] [**flowlimit**] [**policy**] [**cos**][**all**]

Syntax Description

port-string	(Optional) Overrides causes for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
admin	(Optional) Resets adminStatus to up.
linkflap	(Optional) Overrides link flap violation status.
flowlimit	(Optional) Overrides a flow limiting constraint
policy	(Optional) Overrides a policy restriction.
cos	(Optional) Overrides a Class of Service constraint.
all	(Optional) Override all modifiable operStatus down causes

Command Defaults

If no options are specified, all operating status causes will be overridden for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to override all operational causes on all ports:

```
Matrix(rw)->clear port operstatuscause
```

3.3.3 Disabling / Enabling and Naming Ports

Purpose

To disable and re-enable one or more ports, and to assign an alias to a port. By default, all ports are enabled at device startup. You may want to disable ports for security or to troubleshoot network issues.

Commands

The commands used to enable and disable ports are listed below and described in the associated section as shown.

- set port disable (Section 3.3.3.1)
- set port enable (Section 3.3.3.2)
- show port alias (Section 3.3.3.3)
- set port alias (Section 3.3.3.4)
- show forcelinkdown (Section 3.3.3.5)
- set forcelinkdown (Section 3.3.3.6)
- clear forcelinkdown (Section 3.3.3.7)

3.3.3.1 set port disable

Use this command to administratively disable one or more ports.

set port disable *port-string*

Syntax Description

port-string	Specifies the port(s) to disable. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable Fast Ethernet port 1 in module1:

```
Matrix(rw)->set port disable fe.1.1
```

3.3.3.2 set port enable

Use this command to administratively enable one or more ports.

set port enable *port-string*

Syntax Description

port-string	Specifies the port(s) to enable. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable Fast Ethernet port 3 in module1:

```
Matrix(rw)->set port enable fe.1.3
```

3.3.3.3 show port alias

Use this command to display alias name(s assigned to one or more ports.

show port alias [*port-string*]

Syntax Description

port-string	(Optional) Displays alias name(s) for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, aliases for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display alias information for fe.3.1. In this case, an alias has not been assigned:

```
Matrix(rw)->show port alias fe.3.1
Alias not assigned on port fe.3.1.
```

3.3.3.4 set port alias

Use this command to assign an alias name to a port.

set port alias *port-string* [*string*]

Syntax Description

port-string	Specifies the port to which an alias will be assigned. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
string	(Optional) Assigns a text string name to the port.

Command Defaults

If *string* is not specified, the alias assigned to the port will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to assign the alias “management” to fe.3.1:

```
Matrix(rw)->set port alias fe.3.1 management
```

3.3.3.5 show forcelinkdown

Use this command to display the status of the force link down function.

show forcelinkdown

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the status of the force link down function:

```
Matrix(rw)->show forcelinkdown
ForceLinkDown feature is globally enabled
```

3.3.3.6 set forcelinkdown

Use this command to enable or disable the force link down function. When enabled, this forces ports in the "operstatus down" state to become disabled.

set forcelinkdown {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables the force link down function on all ports.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the force link down function:

```
Matrix(rw)->set forcelinkdown enable
```

3.3.3.7 clear forcelinkdown

Use this command to resets the force link down function to the default state of disabled.

clear forcelinkdown

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the force link down function to disabled:

```
Matrix(rw)->clear forcelinkdown
```

3.3.4 Setting Speed and Duplex Mode

Purpose

To review and set the operational speed in Mbps and the default duplex mode: **Half**, for half duplex, or **Full**, for full duplex for one or more ports.

NOTE: These settings only take effect on ports that have auto-negotiation disabled.

Commands

The commands used to review and set port speed and duplex mode are listed below and described in the associated section as shown.

- show port speed (Section 3.3.4.1)
- set port speed (Section 3.3.4.2)
- show port duplex (Section 3.3.4.3)
- set port duplex (Section 3.3.6)

3.3.4.1 show port speed

Use this command to display the default speed setting on one or more ports.

show port speed [*port-string*]

Syntax Description

port-string	(Optional) Displays default speed setting(s) for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, default speed settings for all ports will display.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the default speed setting for 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->show port speed ge.3.14
default speed is 1000 on port ge.3.14.
```

3.3.4.2 set port speed

Use this command to set the default speed of one or more ports. This setting only takes effect on ports that have auto-negotiation disabled.

set port speed *port-string* {**10** | **100** | **1000**}

Syntax Description

port-string	Specifies the port(s) for which to a speed value will be set. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
10 | **100** | **1000**	Specifies the port speed. Valid values are: **10** Mbps, **100** Mbps, or **1000** Mbps.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set Fast Ethernet port 3 in module3 to a port speed of 10 Mbps:

```
Matrix(rw)->set port speed fe.3.3 10
```

3.3.4.3 show port duplex

Use this command to display the default duplex setting (half or full) for one or more ports.

show port duplex [*port-string*]

Syntax Description

port-string	(Optional) Displays default duplex setting(s) for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, default duplex settings for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the default duplex setting for 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->show port duplex ge.3.14
default duplex mode is full on port ge.3.14.
```

3.3.4.4 set port duplex

Use this command to set the default duplex type for one or more ports.

set port duplex *port-string* {**full** | **half**}

NOTE: This command will only take effect on ports that have auto-negotiation disabled.

Syntax Description

port-string	Specifies the port(s) for which duplex type will be set. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
full | **half**	Sets the port(s) to full-duplex or half-duplex operation.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set Fast Ethernet port 17 in module 1 to full duplex:

```
Matrix(rw)->set port duplex fe.1.17 full
```

3.3.5 Enabling / Disabling Jumbo Frame Support

Purpose

To review, enable, and disable jumbo frame support on one or more ports. This allows Gigabit Ethernet ports to transmit frames up to 10 KB in size.

Commands

The commands used to review, enable and disable jumbo frame support are listed below and described in the associated section as shown.

- show port jumbo (Section 3.3.5.1)
- set port jumbo (Section 3.3.5.2)
- clear port jumbo (Section 3.3.5.3)

3.3.5.1 show port jumbo

Use this command to display the status of jumbo frame support and maximum transmission units (MTU) on one or more ports.

show port jumbo [*port-string*]

Syntax Description

port-string	(Optional) Displays the status of jumbo frame support for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, jumbo frame support status for all ports will display.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the status of jumbo frame support for ge.1.1:

```
Matrix(rw)->show port jumbo ge.1.1

Port Number  Jumbo Oper Status  Jumbo Admin Status  Jumbo MTU
-----------  -----------------  ------------------  ---------
ge.1.1       Disabled           Disabled            10239
```

3.3.5.2 set port jumbo

Use this command to enable or disable jumbo frame support on one or more ports.

set port jumbo {**enable** | **disable**} [*port-string*]

NOTE: By default, jumbo frame support is disabled on all ports and path MTU discovery is enabled. When jumbo frame support is enabled, path MTU discovery should not be disabled. For details on setting the path MTU state, refer to Section 2.2.11.2.

Syntax Description

enable | **disable**	Enables or disables jumbo frame support.
port-string	(Optional) Specifies the port(s) on which to disable or enable jumbo frame support. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, jumbo frame support will be enabled or disabled on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to enable jumbo frame support for 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->set port jumbo enable ge.3.14
```

This example shows how to enable jumbo frame support for router in slot 2, router instance 1.:

```
Matrix(rw)->set port jumbo enable rtr.2.1
```

3.3.5.3 clear port jumbo

Use this command to reset jumbo frame support status to enabled on one or more ports.

clear port jumbo [*port-string*]

Syntax Description

port-string	(Optional) Specifies the port(s) on which to reset jumbo frame support status to enabled. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, jumbo frame support status will be reset on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset jumbo frame support status for 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->clear port jumbo ge.3.14
```

3.3.6 Setting Auto-Negotiation and Advertised Ability

Purpose

To review, disable or enable auto-negotiation, and to review or set a port's advertised mode of operation.

During auto-negotiation and advertised ability, the port "tells" the device at the other end of the segment what its capabilities and mode of operation are. If auto-negotiation is disabled, the port reverts to the values specified by default speed, default duplex, and the port flow control commands.

In normal operation, with all capabilities enabled, advertised ability enables a port to "advertise" that it has the ability to operate in any mode. The user may choose to configure a port so that only a portion of its capabilities are advertised and the others are disabled.

NOTE: Advertised ability can be activated only on ports that have auto-negotiation enabled.

Commands

The commands used to review and configure auto-negotiation and advertised ability are listed below and described in the associated section as shown.

- show port negotiation (Section 3.3.6.1)
- set port negotiation (Section 3.3.6.2)
- show port mdix (Section 3.3.6.3)
- set port mdix (Section 3.3.6.4)
- clear port mdix (Section 3.3.6.5)
- show port advertise (Section 3.3.6.6)
- set port advertise (Section 3.3.6.7)
- clear port advertise (Section 3.3.6.8)

3.3.6.1 show port negotiation

Use this command to display the status of auto-negotiation for one or more ports.

show port negotiation [*port-string*]

Syntax Description

port-string	(Optional) Displays auto-negotiation status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, auto-negotiation status for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display auto-negotiation status for 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->show port negotiation ge.3.14
auto-negotiation is enabled on port ge.3.14.
```

3.3.6.2 set port negotiation

Use this command to enable or disable auto-negotiation on one or more ports.

set port negotiation *port-string* {**enable** | **disable**}

Syntax Description

port-string	Specifies the port(s) for which to enable or disable auto-negotiation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
enable | **disable**	Enables or disables auto-negotiation.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable auto-negotiation on 1-Gigabit Ethernet port 3 in module 14:

```
Matrix(rw)->set port negotiation ge.3.14 disable
```

3.3.6.3 show port mdix

Use this command to display the MDI/MDIX mode on one or more ports. This function detects and adapts to straight through (MDI) or cross-over (MDIX) Ethernet cabling on switch ports.

show port mdix [*port-string*] {**all** | **auto** | **mdi** | **mdix**}

Syntax Description

port-string	(Optional) Displays mode for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
all	Displays port(s) MDI and MDIX admin status.
auto	Displays port(s) automatically determining MDI/MDIX.
mdi	Displays port(s) forced to MDI configuration.
mdix	Displays port(s) forced to MDIX configuration.

Command Defaults

If *port-string* is not specified, the mode for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display MDI/MDIX mode for 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->show port negotiation ge.3.14
mdix configuration is auto on port fe.3.14
```

3.3.6.4 set port mdix

Use this command to set MDI/MDIX mode on one or more ports.

set port mdix [*port-string*] {**auto** | **mdi** | **mdix**}

Syntax Description

port-string	(Optional) Sets mode for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
auto	Sets port(s) to automatically determine MDI/MDIX.
mdi	Forces port(s) to MDI configuration.
mdix	Forces port(s) to MDIX configuration.

Command Defaults

If *port-string* is not specified, mode will be set for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to force 1-Gigabit Ethernet port 14 in module 3 to MDIX configuration:

```
Matrix(rw)->set port mdix ge.3.14 mdix
```

3.3.6.5 clear port mdix

Use this command to reset MDIX mode to the default setting of auto on one or more ports.

clear port mdix [*port-string*]

Syntax Description

port-string	(Optional) Resets mode for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, mode will be reset for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset 1-Gigabit Ethernet port 14 in module 3 to auto MDI/MDIX configuration:

```
Matrix(rw)->set port mdix ge.3.14
```

3.3.6.6 show port advertise

Use this command to display the advertised ability on one or more ports.

show port advertise [*port-string*]

Syntax Description

port-string	(Optional) Displays advertised ability for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, advertised ability for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display advertised ability fe.1.16:

```
Matrix(rw)->show port advertise fe.1.16
fe.1.16      capability   advertised    remote
-----------------------------------------------
10BASE-T         yes          yes          no
10BASE-TFD       yes          yes          no
100BASE-TX       yes          yes          no
100BASE-TXFD     yes          yes          no
1000BASE-X       no           no           no
1000BASE-XFD     no           no           no
1000BASE-T       no           no           no
1000BASE-TFD     no           no           no
other            no           no           yes
pause            yes          yes          no
Apause           no           no           no
Spause           no           no           no
Bpause           no           no           no
```

Table 3-3 provides an explanation of the command output.

Table 3-3 show port advertise Output Details

Output	What It Displays...
capability	Whether or not the port is capable of operating in the following modes: • **10t** - 10BASE-T half duplex mode • **10tfd** - 10BASE-T full duplex mode • **100tx** - 100BASE-TX half duplex mode • **100txfd** - 100BASE-TX full duplex mode • **1000x** - 1000BASE-X, -LX, -SX, -CX half duplex mode • **1000xfd** - 1000BASE-X, -LX, -SX, -CX full duplex mode • **1000t** - 1000BASE-T half duplex mode • **1000tfd** - 1000BASE-T full duplex mode • **other** - Other modes. • **pause** - PAUSE for full-duplex links • **apause** - Asymmetric PAUSE for full-duplex links • **spause** - Symmetric PAUSE for full-duplex links • **bpause** - Asymmetric and Symmetric PAUSE for full-duplex links
advertised	Whether or not the port is configured to advertise it is capable of operating in the modes listed.
remote	Whether this port's link partner is advertising the listed mode.

3.3.6.7 set port advertise

Use this command to enable or disable and to configure the advertised ability on one or more ports.

set port advertise *port-string* [**10t**] [**10tfd**] [**100tx**] [**100txfd**] [**1000x**] [**1000xfd**] [**1000t**] [**1000tfd**] [**pause**] [**apause**] [**spause**] [**bpause**]

Syntax Description

port-string	Specifies the port(s) for which to set advertised ability. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
10t	(Optional) Advertises 10BASE-T half duplex mode.
10tfd	(Optional) Advertises 10BASE-T full duplex mode.
100tx	(Optional) Advertises 100BASE-TX half duplex mode.
100txfd	(Optional) Advertises 100BASE-TX full duplex mode.
1000x	(Optional) Advertises 1000BASE-X, -LX, -SX, -CX half duplex mode.
1000xfd	(Optional) Advertises 1000BASE-X, -LX, -SX, -CX full duplex mode.
1000t	(Optional) Advertises 1000BASE-T half duplex mode.
1000tfd	(Optional) Advertises 1000BASE-T full duplex mode.
pause	(Optional) Advertises PAUSE for full-duplex links.
apause	(Optional) Advertises asymmetric PAUSE for full-duplex links.
spause	(Optional) Advertises symmetric PAUSE for full-duplex links.
bpause	(Optional) Advertises asymmetric and symmetric PAUSE for full-duplex links

Command Defaults

At least one optional parameter must be specified.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set fe.3.4 to advertise 100BASE-TX full duplex operation:

```
Matrix(rw)->set port advertise fe.3.4 100txfd
```

3.3.6.8 clear port advertise

Use this command to reset advertised ability to the default setting on one or more ports.

clear port advertise *port-string* [**10t** | **10tfd** | **100tx** | **100txfd** | **1000x** | **1000txfd** | **1000t** | **1000tfd** | **pause** | **apause** | **spause** | **bpause**]

Syntax Description

port-string	Specifies port(s) for which advertised ability will be reset. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
10t	(Optional) Clears 10BASE-T half duplex mode from the port's advertised ability.
10tfd	(Optional) Clears 10BASE-T full duplex mode from the port's advertised ability.
100tx	(Optional) Clears 100BASE-TX half duplex mode from the port's advertised ability.
100txfd	(Optional) Clears 100BASE-TX full duplex mode from the port's advertised ability.
1000x	(Optional) Clears 1000BASE-X, -LX, -SX, -CX half duplex mode from the port's advertised ability.
1000xfd	(Optional) Clears 1000BASE-X, -LX, -SX, -CX full duplex mode from the port's advertised ability.
1000t	(Optional) Clears 1000BASE-T half duplex mode from the port's advertised ability.
1000tfd	(Optional) Clears 1000BASE-T full duplex mode from the port's advertised ability.
pause	(Optional) Clears PAUSE for full-duplex links from the port's advertised ability.
apause	(Optional) Clears asymmetric PAUSE for full-duplex links from the port's advertised ability.
spause	(Optional) Clears symmetric PAUSE for full-duplex links from the port's advertised ability.
bpause	(Optional) Clears asymmetric and symmetric PAUSE for full-duplex links from the port's advertised ability.

Command Defaults

If not specified, all modes of advertised ability will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset all advertised ability to default settings on fe.3.4:

```
Matrix(rw)->clear port advertise fe.3.4
```

3.3.7 Setting Flow Control

Purpose

To review, enable or disable port flow control. Flow control is used to manage the transmission between two devices as specified by IEEE 802.3x to prevent receiving ports from being overwhelmed by frames from transmitting devices.

Commands

The commands used to review and set port flow control are listed below and described in the associated section as shown.

- show port flowcontrol (Section 3.3.7.1)
- set port flowcontrol (Section 3.3.7.2)

3.3.7.1 show port flowcontrol

Use this command to display the flow control state for one or more ports.

show port flowcontrol [*port-string*]

Syntax Description

port-string	(Optional) Displays flow control state for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, flow control information for all ports will be displayed.

Command Mode

Read-Only.

Example

This example shows how to display the port flow control state for fe.1.1-5:

```
Matrix(rw)->show port flowcontrol fe.1.1-5

Port         TX Admin  TX Oper RX Admin  RX Oper TX Pause Count RX Pause Count
------------ -------- -------- -------- -------- -------------- --------------
fe.1.1        enabled disabled  enabled disabled              0              0
fe.1.2        enabled disabled  enabled disabled              0              0
fe.1.3        enabled  enabled  enabled  enabled              0              0
fe.1.4        enabled disabled  enabled disabled              0              0
fe.1.5        enabled disabled  enabled disabled              0              0
```

Table 3-4 provides an explanation of the command output.

Table 3-4 show port flow control Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
TX Admin	Whether or not the port is administratively **enabled** or **disabled** for sending flow control frames.

Table 3-4 show port flow control Output Details (Continued)

Output	What It Displays...
TX Oper	Whether or not the port is operationally **enabled** or **disabled** for sending flow control frames.
RX Admin	Whether or not the port is administratively **enabled** or **disabled** for acknowledging received flow control frames.
RX Oper	Whether or not the port is operationally **enabled** or **disabled** for acknowledging received flow control frames.
TX Pause Count	Number of Pause frames transmitted.
RX Pause Count	Number of Pause frames received.

3.3.7.2 set port flowcontrol

Use this command to enable or disable flow control settings for one or more ports.

set port flowcontrol *port-string* {**receive** | **send** | **both**} {**enable** | **disable**}

Syntax Description

port-string	Specifies port(s) for which to enable or disable flow control. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
receive | **send** | **both**	Enables or disables the port(s) to receive, send, or receive and send flow control packets.
enable | **disable**	Enables or disables flow control settings.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable ports fe.3.1 through 5 to send and receive flow control packets:

```
Matrix(rw)->set port flowcontrol fe.3.1-5 both enable
```

3.3.8 Configuring Link Traps and Link Flap Detection

Purpose

To disable or re-enable link traps and to configure the link flapping detection function. By default, all ports are enabled to send SNMP trap messages indicating changes in their link status (up or down). The link flap function detects when a link is going up and down rapidly (also called “link flapping”) on a physical port, and takes the required actions (disable port, and eventually send notification trap) to stop such a condition. If left unresolved, the “link flapping” condition can be detrimental to network stability because it can trigger Spanning Tree and routing table recalculation.

Commands

The commands used to configure link flap detection are listed below and described in the associated section as shown.

- show port trap (Section 3.3.8.1)
- set port trap (Section 3.3.8.2)
- show linkflap (Section 3.3.8.3)
- set linkflap globalstate (Section 3.3.8.4)
- set linkflap (Section 3.3.8.5)
- set linkflap interval (Section 3.3.8.6)
- set linkflap action (Section 3.3.8.7)
- clear linkflap action (Section 3.3.8.8)
- set linkflap threshold (Section 3.3.8.9)
- set linkflap downtime (Section 3.3.8.10)
- clear linkflap down (Section 3.3.8.11)
- clear linkflap (Section 3.3.8.12)

3.3.8.1 show port trap

Use this command to display whether the port is enabled for generating an SNMP trap message if its link state changes.

show port trap [*port-string*]

Syntax Description

port-string	(Optional) Displays link trap status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, the trap status for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to display link trap status for fe.3.1 through 4:

```
Matrix(rw)->show port trap fe.3.1-4
Link traps enabled on port fe.3.1.
Link traps enabled on port fe.3.2.
Link traps enabled on port fe.3.3.
Link traps enabled on port fe.3.4.
```

3.3.8.2 set port trap

Use this command to enable or disable ports for sending SNMP trap messages when their link status changes.

set port trap *port-string* {**enable** | **disable**}

Syntax Description

port-string	Specifies the port(s) for which to enable or disable link trap messages. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
enable | **disable**	Enables or disables link traps.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable link traps for Fast Ethernet port 3 in module3:

```
Matrix(rw)->set port trap fe.3.3 disable
```

3.3.8.3 show linkflap

Use this command to display link flap detection state and configuration information.

show linkflap {**globalstate** | **portstate** | **parameters** | **metrics** | **portsupported** | **actsupported** | **maximum** | **downports** | **action** | **operstatus** | **threshold** | **interval**] | **downtime** | **currentcount** | **totalcount** | **timelapsed** | **violations** [*port-string*]}

Syntax Description

globalstate	Displays the global enable state of link flap detection.
portstate	Displays the port enable state of link flap detection.
parameters	Displays the current value of settable link flap detection parameters.
metrics	Displays linkflap detection metrics.
portsupported	Displays ports which can support the link flap detection function.
actsupported	Displays link flap detection actions supported by system hardware.
maximum	Displays the maximum allowed linkdowns per 10 seconds supported by system hardware.
downports	Displays ports disabled by link flap detection due to a violation.
action	Displays linkflap actions taken on violating port(s).
operstatus	Displays whether linkflap has deactivated port(s).
threshold	Displays the number of allowed link down transitions before action is taken.
interval	Displays the time period for counting link down transitions.
downtime	Displays how long violating port(s) are deactivated.
currentcount	Displays how many linkdown transitions are in the current interval.
totalcount	Displays how many linkdown transitions have occurred since the last reset.
timelapsed	Displays the time period since the last link down event or reset.

violations	Displays the number of link flap violations since the last reset.
port-string	(Optional) Displays information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

- If not specified, information about all link flap detection settings will be displayed.
- If *port-string* is not specified, information for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display the global status of the link trap detection function:

```
Matrix(rw)->show linkflap globalstate
Linkflap feature globally disabled
```

This example shows how to display ports disabled by link flap detection due to a violation:

```
Matrix(rw)->show linkflap downports
Ports currently held DOWN for Linkflap violations:
None.
```

This example shows how to display the link flap parameters table:

```
Matrix(rw)->show linkflap parameters
Linkflap Port Settable Parameter Table (X means error occurred)
Port      LF Status  Actions  Threshold   Interval    Downtime
--------  ---------  -------  ----------  ----------  ----------
ge.1.1    disabled   .......  10          5           300
ge.1.2    enabled    D..S..T  3           5           300
ge.1.3    disabled   ...S..T  10          5           300
```

Table 3-5 provides an explanation of the **show linkflap parameters** command output.

Table 3-5 show linkflap parameters Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
LF Status	Link flap enabled state.
Actions	Actions to be taken if the port violates allowed link flap behavior. D = disabled, S = Syslog entry will be generated, T= SNMP trap will be generated.
Threshold	Number of link down transitions necessary to trigger the link flap action.
Interval	Time interval (in seconds) for accumulating link down transitions.
Downtime	Interval (in seconds) port(s) will be held down after a link flap violation

This example shows how to display the link flap metrics table:

```
Matrix(rw)->show linkflap metrics
Port      LinkStatus   CurrentCount  TotalCount  TimeElapsed  Violations
--------  -----------  ------------  ----------  -----------  -------------
ge.1.1    operational  0             0           241437       0
ge.1.2    disabled     4             15          147          5
ge.1.3    operational  3             3           241402       0
```

Table 3-6 provides an explanation of the **show linkflap metrics** command output.

Table 3-6 show linkflap metrics Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
LinkStatus	Link status according to the link flap function.
CurrentCount	Link down count accruing toward the link flap threshold.
TotalCount	Number of link downs since system start,

Table 3-6 show linkflap metrics Output Details (Continued)

Output	What It Displays...
TimeElapsed	Time (in seconds) since the last link down event.
Violations	Number of link flap violations on listed ports since system start.

3.3.8.4 set linkflap globalstate

Use this command to globally enable or disable the link flap detection function. By default, the function is disabled globally and on all ports. If disabled globally after per-port settings have been configured using the commands later in this chapter, per-port settings will be retained.

set linkflap globalstate {**disable** | **enable**}

Syntax Description

disable | **enable**	Globally disables or enables the link flap detection function.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to globally enable the link trap detection function:

```
Matrix(rw)->set linkflap globalstate enable
```

3.3.8.5 set linkflap

Use this command to enable or disable link flap monitoring on one or more ports.

set linkflap portstate {**disable** | **enable**} [*port-string*]

Syntax Description

disable | **enable**	Disables or enables the link flap detection function.
port-string	(Optional) Specifies the port(s) on which to disable or enable monitoring. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, all ports will be disabled or enabled.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the link trap monitoring on all ports:

```
Matrix(rw)->set linkflap portstate enable
```

3.3.8.6 set linkflap interval

Use this command to set the time interval (in seconds) for accumulating link down transitions.

set linkflap interval *port-string interval_value*

Syntax Description

port-string	Specifies the port(s) on which to set the link flap interval. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
interval_value	Specifies an interval in seconds. A value of 0 will set the interval to forever.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set the link flap interval on port fe.1.4 to 1000 seconds:

```
Matrix(rw)->set linkflap interval fe.1.4 1000
```

3.3.8.7 set linkflap action

Use this command to set reactions to a link flap violation.

set linkflap action *port-string* {**disableInterface** | **gensyslogentry** | **gentrap** | **all**}

Syntax Description

port-string	Specifies the port(s) on which to set the link flap action. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
disableInterface | **gensyslogentry** | **gentrap** | **all**	Sets the reaction as: • Disabling the interface • Generating a Syslog entry • Generating an SNMP trap message, or • All of the above.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set the link flap violation action on port fe.1.4 to generating a Syslog entry:

```
Matrix(rw)->set linkflap action fe.1.4 gensyslogentry
```

3.3.8.8 clear linkflap action

Use this command to clear reactions to a link flap violation.

clear linkflap action [*port-string*} {**disableInterface** | **gensyslogentry** | **gentrap** | **all**}

Syntax Description

port-string	(Optional) Specifies the port(s) on which to clear the link flap action. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
disableInterface | **gensyslogentry** | **gentrap** | **all**	Clears the reaction of: • Disabling the interface • Generating a Syslog entry • Generating an SNMP trap message, or • All of the above.

Command Defaults

If *port-string* is not specified, actions will be cleared on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to clear all link flap violation actions on all ports:

```
Matrix(rw)->clear linkflap action all
```

3.3.8.9 set linkflap threshold

Use this command to set the link flap action trigger count.

set linkflap threshold *port-string threshold_value*

Syntax Description

port-string	Specifies the port(s) on which to set the link flap action trigger count. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
threshold_value	Specifies the number of link down transitions necessary to trigger the link flap action.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set the link flap threshold on port fe.1.4 to 5:

```
Matrix(rw)->set linkflap threshold fe.1.4 5
```

3.3.8.10 set linkflap downtime

Use this command to set the time interval (in seconds) one or more ports will be held down after a link flap violation.

set linkflap downtime *port-string downtime_value*

Syntax Description

port-string	Specifies the port(s) on which to set the link flap downtime. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
downtime_value	Specifies a downtime in seconds. A value of 0 will set the downtime to forever.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set the link flap downtime on port fe.1.4 to 5000 seconds:

```
Matrix(rw)->set linkflap downtime fe.1.4 5000
```

3.3.8.11 clear linkflap down

Use this command to toggle link flap disabled ports to operational.

clear linkflap down [*port-string*]

Syntax Description

port-string	Specifies the port(s) to make operational. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, all ports disabled by a link flap violation will be made operational.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to make disabled port fe.1.4 operational:

```
Matrix(rw)->clear linkflap down fe.1.4
```

3.3.8.12 clear linkflap

Use this command to clear all link flap options and / or statistics on one or more ports.

clear linkflap {**all | stats** [*port-string*] | **parameter** *port-string* {**threshold** | **interval** | **downtime** | **all**}

Syntax Description

all | **stats**	Clears all options and statistics, or clears only statistics.
parameter	Clears link flap parameters.
threshold | **interval** | **downtime** | **all**	Clears link flap threshold, interval, downtime or all parameters.
port-string	(Optional unless parameter is specified) Specifies the port(s) on which to clear settings. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, settings and/or statistics will be cleared on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to clear all link flap options on port fe.1.4:

```
Matrix(rw)->clear linkflap all fe.1.4
```

3.3.9 Configuring Broadcast Suppression

Purpose

To review, disable or set the broadcast thresholds on one or more ports. This limits the amount of received broadcast frames that the specified port will be allowed to switch out to other ports. Broadcast suppression protects against broadcast storms, leaving more bandwidth available for critical data.

Commands

The commands used to review and configure port broadcast suppression are listed below and described in the associated section as shown.

- show port broadcast (Section 3.3.9.1)
- set port broadcast (Section 3.3.9.2)
- clear port broadcast (Section 3.3.9.3)

3.3.9.1 show port broadcast

Use this command to display port broadcast suppression information for one or more ports.

show port broadcast [*port-string*]

Syntax Description

port-string	(Optional) Displays broadcast status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, broadcast status of all ports will be displayed.

Command Mode

Read-Only.

Example

This example shows how to display broadcast information for Fast Ethernet port 2 in module 2:

```
Matrix(rw)->show port broadcast fe.2.2
Port          Total BC       Threshold       Peak Rate    Peak Rate Time
              Packets        (pkts/s)        (pkts/s)     (ddd:hh:mm:ss)
-------------------------------------------------------------------------
fe.2.2        165            148810          8            000:05:57:37
```

Table 3-7 provides an explanation of the command output.

Table 3-7 show port broadcast Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
Total BC Packets	Total broadcast packets received on this port.
Threshold (pkts/s)	Current broadcast threshold in packets per second on this port.

Table 3-7 show port broadcast Output Details (Continued)

Output	What It Displays...
Peak Rate (pkts/s)	Peak rate of broadcast transmission received on this port in packets per second.
Peak Rate Time (ddd:hh:mm:ss)	Time (in day, hours, minutes and seconds) the peak rate was reached on this port.

3.3.9.2 set port broadcast

Use this command to set the broadcast suppression limit, in packets per second, on one or more ports. This sets a threshold on the broadcast traffic that is received and switched out to other ports.

set port broadcast *port-string threshold-val*

Syntax Description

port-string	Specifies the port(s) for which to set broadcast suppression. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
threshold-val	Sets the packets per second threshold on broadcast traffic. Maximum value is 1488100 for Gigabit and 148810 for Fast Ethernet. If set to the maximum value, thresholding will be disabled.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set broadcast suppression to 800 packets per second on Fast Ethernet ports 1 through 5 in module 1:

```
Matrix(rw)->set port broadcast fe.1.1-5 800
```

3.3.9.3 clear port broadcast

Use this command to reset the broadcast threshold and/or clear the peak rate and peak time values on one or switch more ports.

clear port broadcast *port-string* [**threshold**] [**peak**]

Syntax Description

port-string	Specifies the port(s) on which broadcast settings will be cleared. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
threshold	(Optional) Clears the broadcast threshold setting.
peak	(Optional) Clears the broadcast peak rate and peak rate time values.

Command Defaults

If not specified, both **threshold** and **peak** settings will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all broadcast suppression settings on Fast Ethernet ports 1 through 5 in module1:

```
Matrix(rw)->clear port broadcast fe.1.1-5
```

3.4 OVERVIEW: PORT MIRRORING

CAUTION: Port mirroring configuration should be performed only by personnel who are knowledgeable about the effects of port mirroring and its impact on network operation.

The Matrix device allows you to mirror (or redirect) the traffic being switched on a port for the purposes of network traffic analysis and connection assurance. When port mirroring is enabled, one port becomes a monitor port for another port within the device.

3.4.1 Supported Mirrors

The following types of ports can participate in mirroring on the Matrix Series device:

- Physical ports, including front panel and FTM-1 ports
- Virtual ports, including Link Aggregation Group (LAG) and host ports. For details on configuring ports for link aggregation, refer to Section 3.5.

3.4.2 Active Destination Port Configurations

Each Matrix DFE-Gold Series device supports three mirroring destination ports, which can be configured in a many-to-one mirroring configuration (that is, many destinations mirrored to one source port).

3.4.3 Setting Port Mirroring

Purpose

To review and configure port mirroring on the device.

Commands

The commands used to review and configure port mirroring are listed below and described in the associated section as shown.

- show port mirroring (Section 3.4.3.1)
- set port mirroring (Section 3.4.3.2)
- clear port mirroring (Section 3.4.3.3)

3.4.3.1 show port mirroring

Use this command to display the source and target ports for mirroring, and whether mirroring is currently enabled or disabled for those ports.

show port mirroring

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display port mirroring information. In this case, fe.1.4 is configured as a source port and fe.1.11 is a target, but mirroring is not currently enabled between the ports:

```
Matrix(rw)->show port mirroring

Port Mirroring
==============
 Source Port = fe.1.4
 Target Port = fe.1.11
 Frames Mirrored = Rx and Tx
 Port Mirroring status disabled.
```

3.4.3.2 set port mirroring

Use this command to create a new mirroring relationship or to enable or disable an existing mirroring relationship between two ports.

set port mirroring {**create** | **disable** | **enable**} | **igmp-mcast** {**enable** | **disable**}*source destination* [**both** | **rx** | **tx**]

Syntax Description

create | **disable** | **enable**	Creates, disables or enables mirroring settings on the specified ports.
igmp-mcast enable | **disable**	Enables or disables the mirroring of IGMP multicast frames.
source	Specifies the source port designation. This is the port on which the traffic will be monitored. For a description of port types that can participate in mirroring, refer to Section 3.4.1. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
destination	Specifies the target port designation. This is the port that will duplicate or "mirror" all the traffic on the monitored port. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
both | **rx** | **tx**	(Optional) Specifies that frames received and transmitted by the source port, only frames received, or only frames transmitted will be mirrored.

Command Defaults

If not specified, **both** received and transmitted frames will be mirrored.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable port mirroring of transmitted and received frames with fe.1.4 as the source port and fe.1.11 as the target port:

```
Matrix(rw)->set port mirroring enable fe.1.4 fe.1.11 both
```

3.4.3.3 clear port mirroring

Use this command to clear a port mirroring relationship.

clear port mirroring {**igmp-mcast** | *source destination*}

Syntax Description

igmp-mcast	Clears IGMP multicast mirroring.
source	Specifies the source port of the mirroring configuration to be cleared. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
destination	Specifies the target port of the mirroring configuration to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear port mirroring between source port fe.1.4 and target port fe.1.11:

```
Matrix(rw)->clear port mirroring fe.1.4 fe.1.11
```

3.5 OVERVIEW: LINK AGGREGATION CONTROL PROTOCOL (LACP)

CAUTION: Link aggregation configuration should only be performed by personnel who are knowledgeable about Spanning Tree and Link Aggregation, and fully understand the ramifications of modifications beyond device defaults. Otherwise, the proper operation of the network could be at risk.

Using multiple links simultaneously to increase bandwidth is a desirable switch feature, which can be accomplished if both sides agree on a set of ports that are being used as a Link Aggregation Group (LAG). Once a LAG is formed from selected ports, problems with looping can be avoided since the Spanning Tree can treat this LAG as a single port.

Enabled by default on Matrix devices, the Link Aggregation Control Protocol (LACP) logically groups interfaces together to create a greater bandwidth uplink, or link aggregation, according to the IEEE 802.3ad standard. This standard allows the switch to determine which ports are in LAGs and configure them dynamically. Since the protocol is based on the IEEE 802.3ad specification, any switch from any vendor that supports this standard can aggregate links automatically.

802.3ad LACP aggregations can also be run to end-users (i.e.; a server) or to a router.

NOTE: Earlier (proprietary) implementations of port aggregation referred to groups of aggregated ports as “trunks”.

3.5.1 LACP Operation

For each aggregatable port in the device, LACP:

- Maintains configuration information (reflecting the inherent properties of the individual links as well as those established by management) to control aggregation.
- Exchanges configuration information with other devices to allocate the link to a Link Aggregation Group (LAG).

NOTE: A given link is allocated to, at most, one Link Aggregation Group (LAG) at a time. The allocation mechanism attempts to maximize aggregation, subject to management controls.

- Attaches the port to the aggregator used by the LAG, and detaches the port from the aggregator when it is no longer used by the LAG.
- Uses information from the partner device's link aggregation control entity to decide whether to aggregate ports.

The operation of LACP involves the following activities:

- Checking that candidate links can actually be aggregated.
- Controlling the addition of a link to a LAG, and the creation of the group if necessary.
- Monitoring the status of aggregated links to ensure that the aggregation is still valid.
- Removing a link from a LAG if its membership is no longer valid, and removing the group if it no longer has any member links.

In order to allow LACP to determine whether a set of links connect to the same device, and to determine whether those links are compatible from the point of view of aggregation, it is necessary to be able to establish

- A globally unique identifier for each device that participates in link aggregation.
- A means of identifying the set of capabilities associated with each port and with each aggregator, as understood by a given device.
- A means of identifying a LAG and its associated aggregator.

3.5.2 LACP Terminology

Table 3-8 defines key terminology used in LACP configuration.

Table 3-8 LACP Terms and Definitions

Term	Definition
Aggregator	Virtual port that controls link aggregation for underlying physical ports. Each Matrix Series module provides aggregator ports, which are designated in the CLI as **lag.0.1** through **lag.0.4**.
LAG	Link Aggregation Group. Once underlying physical ports (i.e.; **fe.x.x**, or **ge.x.x**) are associated with an aggregator port, the resulting aggregation will be represented as one LAG with a **lag.x.x** port designation.
LACPDU	Link Aggregation Control Protocol Data Unit. The protocol exchanges aggregation state/mode information by way of a port's actor and partner operational states. LACPDUs sent by the first party (the actor) convey to the second party (the actor's protocol partner) what the actor knows, both about its own state and that of its partner.
Actor and Partner	An actor is the local device sending LACPDUs. Its protocol partner is the device on the other end of the link aggregation. Each maintains current status of the other via LACPDUs containing information about their ports' LACP status and operational state.
Admin Key	Value assigned to aggregator ports and physical ports that are candidates for joining a LAG. The LACP implementation on Matrix Series devices will use this value to form an oper key and will determine which underlying physical ports are capable of aggregating by comparing oper keys. Aggregator ports allow only underlying ports with oper keys matching theirs to join their LAG.
System Priority	Value used to build a LAG ID, which determines aggregation precedence. If there are two partner devices competing for the same aggregator, LACP compares the LAG IDs for each grouping of ports. The LAG with the lower LAG ID is given precedence and will be allowed to use the aggregator. **NOTE:** Only one LACP system priority can be set on a Matrix Series device, using either the **set lacp asyspri** command (Section 3.5.4.4), or the **set port lacp** command (Section 3.5.4.13).

3.5.3 Matrix Series Usage Considerations

In normal usage (and typical implementations) there is no need to modify any of the default LACP parameters on the Matrix Series device. The default values will result in the maximum number of aggregations possible. If the switch is placed in a configuration with its peers not running the protocol, no dynamic link aggregations will be formed and the switch will function normally (that is, will block redundant paths). For information about building static aggregations, refer to **set lacp static** (Section 3.5.4.7).

Each Matrix Series module provides 4 virtual link aggregator ports, which are designated in the CLI as **lag.0.1** through **lag.0.4**. Once underlying physical ports (i.e.; **fe.x.x**, or **ge.x.x**) are associated with an aggregator port, the resulting aggregation will be represented as one LAG with a **lag.x.x** port designation. LACP determines which underlying physical ports are capable of aggregating by comparing operational keys. Aggregator ports allow only underlying ports with keys matching theirs to join their LAG.

LACP uses a system priority value to build a LAG ID, which determines aggregation precedence. If there are two partner devices competing for the same aggregator, LACP compares the LAG IDs for each grouping of ports. The LAG with the lower LAG ID is given precedence and will be allowed to use the aggregator.

NOTE: Only one LACP system priority can be set on a Matrix Series device, using either the **set lacp asyspri** command (Section 3.5.4.4), or the **set port lacp** command (Section 3.5.4.13).

There are a few cases in which ports will not aggregate:

- An underlying physical port is attached to another port on this same switch (loopback).
- There is no available aggregator for two or more ports with the same LAG ID. This can happen if there are simply no available aggregators, or if none of the aggregators have a matching admin key and system priority.
- 802.1x authentication is enabled, and ports that would otherwise aggregate are not 802.1X authorized.

The LACP implementation on the Matrix Series device will allow up to a maximum of four ports into a LAG. The device with the lowest LAG ID determines which underlying physical ports are allowed into a LAG based on the ports' LAG port priority. Ports with the lowest LAG port priority values are allowed into the LAG and all other speed groupings go into a standby state.

NOTE: To aggregate, underlying physical ports must be running in full duplex mode and must be of the same operating speed.

3.5.4 Configuring Link Aggregation

Purpose

To disable and re-enable the Link Aggregation Control Protocol (LACP), to display and configure LACP settings for one or more aggregator ports, and to display and configure the LACP settings for underlying physical ports that are potential members of a link aggregation.

Commands

The commands used to review and configure LACP are listed below and described in the associated section as shown.

- show lacp (Section 3.5.4.1)
- set lacp (Section 3.5.4.2)
- clear lacp state (Section 3.5.4.3)
- set lacp asyspri (Section 3.5.4.4)
- set lacp aadminkey (Section 3.5.4.5)
- clear lacp (Section 3.5.4.6)
- set lacp static (Section 3.5.4.7)
- clear lacp static (Section 3.5.4.8)
- show lacp singleportlag (Section 3.5.4.9)
- set singleportlag (Section 3.5.4.10)
- clear singleportlag (Section 3.5.4.11)
- show port lacp (Section 3.5.4.12)
- set port lacp (Section 3.5.4.13)
- clear port lacp (Section 3.5.4.14)
- show lacp flowRegeneration (Section 3.5.4.15)
- set lacp flowRegeneration (Section 3.5.4.16)
- clear lacp flowRegeneration (Section 3.5.4.17)
- show lacp outportAlgorithm (Section 3.5.4.18)
- set lacp outportAlgorithm (Section 3.5.4.19)
- clear lacp outportAlgorithm (Section 3.5.4.20)

3.5.4.1 show lacp

Use this command to display the global LACP enable state, or to display information about one or more aggregator ports. Each Matrix Series module provides 4 virtual link aggregator ports, which are designated in the CLI as **lag.0.1** through **lag.0.4**. Once underlying physical ports (i.e.; **fe.x.x**, **ge.x.x**) are associated with an aggregator port, the resulting aggregation will be represented as one Link Aggregation Group (LAG) with a **lag.x.x** port designation.

show lacp [**state** | *port-string*]

Syntax Description

state	(Optional) Displays the global LACP enable state.
port-string	(Optional) Displays LACP information for specific LAG port(s). Valid port designations are lag.0.1 - 4.

Command Defaults

- If **state** is not specified, aggregator information will be displayed for specified ports.
- If *port-string* is not specified, link aggregation information for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display information for aggregator port 4:

```
Matrix(rw)->show lacp lag.0.4

Aggregator:  lag.0.4
                           Actor                  Partner
System Identifier:  00:e0:63:9d:b5:87      00:00:00:00:00:00
  System Priority:              32768                  32768
        Admin Key:              32768
         Oper Key:              32768                  32768
   Attached Ports:  None.
```

Table 3-9 provides an explanation of the command output.

Table 3-9 show lacp Output Details

Output	What It Displays...
Aggregator	LAG port designation. Each Matrix Series module provides 4 virtual link aggregator ports, which are designated in the CLI as **lag.0.1** through **lag.0.4**. Once underlying physical ports (i.e.; **fe.x.x**, **ge.x.x**) are associated with an aggregator port, the resulting Link Aggregation Group (LAG) is represented with a **lag.x.x** port designation.
Actor	Local device participating in LACP negotiation.
Partner	Remote device participating in LACP negotiation.
System Identifier	MAC addresses for actor and partner.
System Priority	System priority value which determines aggregation precedence. Only one LACP system priority can be set on a Matrix Series device, using either the **set lacp asyspri** command (Section 3.5.4.4), or the **set port lacp** command (Section 3.5.4.13).
Admin Key	Port's administratively assigned key.
Oper Key	Port's operational key, derived from the admin key. Only underlying physical ports with oper keys matching the aggregator's will be allowed to aggregate.
Attached Ports	Underlying physical ports associated with this aggregator. Matrix DFE-Gold Series devices allow for up to four ports per aggregator.

3.5.4.2 set lacp

Use this command to disable or enable the Link Aggregation Control Protocol (LACP) on the device. LACP is enabled by default.

set lacp {**disable** | **enable**}

Syntax Description

disable | **enable**	Disables or enables LACP.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable LACP:

```
Matrix(rw)->set lacp disable
```

3.5.4.3 clear lacp state

Use this command to reset LACP to the default state of enabled.

clear lacp state

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset LACP to enabled

```
Matrix(rw)->clear lacp state
```

3.5.4.4 set lacp asyspri

Use this command to set the LACP system priority. LACP uses this value to determine aggregation precedence. If there are two partner devices competing for the same aggregator, LACP compares the LAG IDs for each grouping of ports. The LAG with the lower LAG ID is given precedence and will be allowed to use the aggregator.

NOTE: Only one LACP system priority can be set on a Matrix Series device, using either this command, or the **set port lacp** command (Section 3.5.4.13).

set lacp asyspri *value*

Syntax Description

asyspri	Sets the system priority to be used in creating a LAG (Link Aggregation Group) ID. Valid values are **0** to **65535**.
value	Specifies a system priority value. Valid values are **0** to **65535**, with precedence given to lower values.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the LACP system priority to 1000:

```
Matrix(rw)->set lacp asyspri 1000
```

3.5.4.5 set lacp aadminkey

Use this command to set the administratively assigned key for one or more aggregator ports. LACP will use this value to form an oper key. Only underlying physical ports with oper keys matching those of their aggregators will be allowed to aggregate.

set lacp aadminkey *port-string value*

Syntax Description

port-string	Specifies the LAG port(s) on which to assign an admin key.
value	Specifies an admin key value to set. Valid values are **0** to **65535**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the LACP admin key to 2000 for LAG port 4:

```
Matrix(rw)->set lacp aadminkey lag.0.4 2000
```

3.5.4.6 clear lacp

Use this command to clear LACP system priority or admin key settings.

clear lacp {[**asyspri]** [**aadminkey** *port-string*]}

Syntax Description

asyspri	Clears system priority.
aadminkey *port-string*	Clears admin keys for one or more ports.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the actor admin key for LAG port 4:

```
Matrix(rw)->clear lacp aadminkey lag.0.4
```

3.5.4.7 set lacp static

Use this command to assign one or more underlying physical ports to a Link Aggregation Group (LAG). Matrix DFE-Gold Series devices allow for up to four ports per aggregator.

NOTES: At least two ports need to be assigned to a LAG port for a Link Aggregation Group to form and attach to the specified LAG port.

The same usage considerations for dynamic LAGs discussed in Section 3.5.3 apply to statically created LAGs.

Static LAG configuration should be performed by personnel who are knowledgeable about Link Aggregation. Misconfiguration can result in LAGs not being formed, or in ports attaching to the wrong LAG port, affecting proper network operation.

set lacp static *lagportstring* [*key*] *port-string*

Syntax Description

lagportstring	Specifies the LAG aggregator port to which new ports will be assigned.
key	(Optional) Specifies the new member port and LAG port aggregator admin key value. Only ports with matching keys are allowed to aggregate. Valid values are **0 - 65535**. **NOTE:** This key value must be unique. If ports other than the desired underlying physical ports share the same admin key value, aggregation will fail or undesired aggregations will form.
port-string	Specifies the member port(s) to add to the LAG. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If not specified, a *key* will be assigned according to the specified aggregator. For example a key of 4 would be assigned to lag.0.4.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to add port fe.1.6 to the LAG of aggregator port 4:

```
Matrix(rw)->set lacp static lag.0.4 fe.1.6
```

3.5.4.8 clear lacp static

Use this command to remove specific ports from a Link Aggregation Group.

clear lacp static *lagportstring port-string*

Syntax Description

lagportstring	Specifies the LAG aggregator port from which ports will be removed.
port-string	Specifies the port(s) to remove from the LAG. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove Fast Ethernet port 6 in module 1 from the LAG of aggregator port 4:

```
Matrix(rw)->clear lacp static lag.0.4 fe.1.6
```

3.5.4.9 show lacp singleportlag

Use this command to display the status of the single port LAG function.

show lacp singleportlag

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the status of the single port LAG function:

```
Matrix(rw)->show lacp singleportlag
Single Port LAGs:              enabled
```

3.5.4.10 set singleportlag

Use this command to enable or disable the formation of single port LAGs. When enabled, this maintains LAGs when only one port is receiving protocol transmissions from a partner.

set lacp singleportlag {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables the formation of single port LAGs.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable single port LAGs:

```
Matrix(rw)->set lacp singleportlag enable
```

3.5.4.11 clear singleportlag

Use this command to reset the single port LAG function back to the default state of disabled.

clear lacp singleportlag

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the single port LAG function back to disabled:

```
Matrix(rw)->clear lacp singleportlag
```

3.5.4.12 show port lacp

Use this command to display link aggregation information for one or more underlying physical ports.

show port lacp port *port-string* {[**status** {**detail** | **summary**}] | [**counters**]} [**sort** {**port** | **lag**}]

Syntax Description

port *port-string*	Displays LACP information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
status detail | **summary**	Displays LACP status in detailed or summary information.
counters	Displays LACP counter information.
sort port | **lag**	(Optional) When **summary** is specified, sorts display by port designation or LAG ID.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display detailed LACP status information for port fe.1.12:

```
Matrix(rw)-> show port lacp port fe.1.12 status detail
Port Instance:                fe.1.12
ActorPort:                       1411  PartnerAdminPort:                      1411
ActorSystemPriority:            32768  PartnerOperPort:                       1411
ActorPortPriority:              32768  PartnerAdminSystemPriority:           32768
ActorAdminKey:                  32768  PartnerOperSystemPriority:            32768
ActorOperKey:                   32768  PartnerAdminPortPriority:             32768
ActorAdminState:              -----GlA  PartnerOperPortPriority:              32768
ActorOperState:               -F----lA  PartnerAdminKey:                       1411
ActorSystemID:     00-e0-63-9d-b5-87  PartnerOperKey:                        1411
SelectedAggID:                   none  PartnerAdminState:                --DCSGlp
AttachedAggID:                   none  PartnerOperState:                 --DC-Glp
MuxState:                    Detached  PartnerAdminSystemID:   00-00-00-00-00-00
DebugRxState:          port Disabled   PartnerOperSystemID:    00-00-00-00-00-00
```

NOTES: State definitions, such as ActorAdminState and Partner AdminState, are indicated with letter abbreviations. If the **show port lacp** command displays one or more of the following letters, it means the state is true for the associated actor or partner ports:
E = Expired; **F** = Defaulted; **D** = Distributing (tx enabled); **C** = Collecting (rx enabled); **S** = Synchronized (actor and partner agree); **G** = Aggregation allowed; **S/l** = Short/Long LACP timeout; **A/p** = Active/Passive LACP.

For more information about these states, refer to **set port lacp** (Section 3.5.4.13) and the IEEE 802.3 2002 specification.

This example shows how to display summarized LACP status information for port fe.1.12:

```
Matrix(rw)->show port lacp port fe.1.12 status summary
Port     Aggr         Actor System            Partner System
                   Pri:   System ID:  Key:    Pri: System ID:     Key:
fe.1.12    none [(32768,00e0639db587,32768),(32768,000000000000, 1411)]
```

This example shows how to display LACP counters for port fe.1.12:

```
Matrix(rw)->show port lacp port fe.1.12 counters
Port Instance:                          fe.1.12
LACPDUsRx:                           0  MarkerPDUsRX:                           0
LACPDUsTx:                           0  MarkerPDUsTx:                           0
IllegalRx:                           0  MarkerResponsePDUsRx:                   0
UnknownRx:                           0  MarkerResponsePDUsTx:                   0
ActorSyncTransitionCount:            0  PartnerSyncTransitionCount:             0
ActorChangeCount:                    1  PartnerChangeCount:                     0
ActorChurnCount:                     0  PartnerChurnCount:                      0
ActorChurnState:        ChurnMonitor    PartnerChurnState:          ChurnMonitor
MuxState:                   detached
MuxReason:                               BEGIN = TRUE
```

3.5.4.13 set port lacp

Use this command to set link aggregation parameters for one or more ports. These settings will determine the specified underlying physical ports' ability to join a LAG, and their administrative state once aggregated.

set port lacp port *port-string* {[**aadminkey** *aadminkey*] [**aportpri** *aportpri*] [**asyspri** *asyspri*] [**aadminstate** {**lacpactive** | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire**}] [**padminsyspri** *padminsyspri*] [**padminsysid** *padminsysid*] [**padminkey** *padminkey*] [**padminportpri** *padminportpri*] [**padminport** *padminport*] [**padminstate** {**lacpactive** | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire**}] [**enable** | [**disable**]}

NOTE: LACP commands and parameters beginning with an "a" (such as **aadminkey**) set actor values. Corresponding commands and parameters beginning with a "p" (such as **padminkey**) set corresponding partner values. Actor refers to the local device participating in LACP negotiation, while partner refers to its remote device partner at the other end of the negotiation. Actors and partners maintain current status of the other via LACPDUs containing information about their ports' LACP status and operational state.

Syntax Description

port *port-string*	Specifies the physical port(s) on which to configure LACP. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
aadminkey *aadminkey*	Sets the port's actor admin key. LACP will use this value to form an oper key and will determine which underlying physical ports are capable of aggregating by comparing oper keys. Aggregator ports allow only underlying ports with oper keys matching theirs to join their LAG. Valid values are **1** - **65535**.
aportpri *aportpri*	Sets the port's actor port priority. Valid values are **0** - **65535**, with lower values designating higher priority.

asyspri *asyspri*	Sets the port's actor system priority. The LACP implementation on the Matrix Series device uses this value to determine aggregation precedence when there are two devices competing for the same aggregator. Valid values are **0** - **65535**, with higher precedence given to lower values. **NOTE:** Only one LACP system priority can be set on a Matrix Series device, using either this command, or the **set lacp asyspri** command (Section 3.5.4.4).
aadminstate lacpactive | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire**	Sets the port's actor LACP administrative state to allow for: • **lacpactive -** Transmitting LACP PDUs. • **lacptimeout -** Transmitting LACP PDUs every 1 sec. vs 30 sec. (default). • **lacpagg -** Aggregation on this port. • **lacpsync -** Transition to synchronization state. • **lacpcollect -** Transition to collection state. • **lacpdist -** Transition to distribution state. • **lacpdef** - Transition to defaulted state. • **lacpexpire -** Transition to expired state.
padminsyspri *padminsyspri*	Sets a default value to use as the port's partner priority. Valid values are **0** - **65535**, with lower values given higher priority.
padminsysid *padminsysid*	Sets a default value to use as the port's partner system ID. This is a MAC address.
padminkey *padminkey*	Sets a default value to use as the port's partner admin key. Only ports with matching admin keys are allowed to aggregate. Valid values are **1** - **65535**.
padminportpri *padminportpri*	Sets a default value to use as the port's partner port priority. Valid values are **0** - **65535**, with lower values given higher priority.
padminport *padminport*	Sets a default value to use as the port's partner admin value. Valid values are **1** - **65535**.

padminstate lacpactive | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire**	Sets a port's partner LACP administrative state. See **aadminstate** for valid options.
enable	(Optional) Enables LACPDU processing on this port.
disable	(Optional) Disables LACPDU processing on this port.

Command Defaults

- At least one parameter must be entered per *port-string*.
- If **enable** or **disable** are not specified, port(s) will be enabled with the LACP parameters entered.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the actor admin key to 3555 for port ge.3.16:

```
Matrix(rw)->set port lacp ge.3.16 aadminkey 3555
```

3.5.4.14 clear port lacp

Use this command to clear link aggregation settings for one or more ports.

clear port lacp port *port-string* {[**aadminkey**] [**aportpri**] [**asyspri**] [**aadminstate** {**lacpactive** | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire** | **all**}] [**padminsyspri**] [**padminsysid**] [**padminkey**] [**padminportpri**] [**padminport**] [**padminstate** {**lacpactive** | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire** | **all**}]}

Syntax Description

port *port-string*	Specifies the physical port(s) on which LACP settings will be cleared. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
aadminkey	Clears a port's actor admin key.
aportpri	Clears a port's actor port priority.
asyspri	Clears the port's actor system priority.
aadminstate **lacpactive** | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire** | **all**	Clears a port's specific actor admin state, or all actor admin state(s). For descriptions of specific states, refer to the **set port lacp** command (Section 3.5.4.13.)
padminsyspri	Clears the port's default partner priority value.
padminsysid	Clears the port's default partner system ID.
padminkey	Clears the port's default partner admin key.
padminportpri	Clears the port's default partner port priority.
padminport	Deletes a partner port from the LACP configuration.

padminstate **lacpactive** | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire** | **all**	Clears the port's specific partner admin state, or all partner admin state(s).

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all link aggregation parameters for port ge.3.16:

```
Matrix(rw)->clear port lacp port ge.3.16
```

3.5.4.15 show lacp flowRegeneration

Use this command to display the LACP flow regeneration state.

show lacp flowRegeneration

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the current LACP flow regeneration state:

```
Matrix(rw)->show lacp flowRegeneration
disable
```

3.5.4.16 set lacp flowRegeneration

Use this command to enable or disable LACP flow regeneration. When enabled and a new port joins a link aggregation group (LAG), LACP will redistribute all existing flows over the LAG. It will also attempt to load balance existing flows to take advantage of ports added to the LAG. When flow regeneration is disabled and a new port joins a LAG, LACP will only distribute new flows over the increased number of ports in the LAG and will leave existing flows intact.

set lacp flowRegeneration {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables LACP flow regeneration

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable LACP flow regeneration:

```
Matrix(rw)->set lacp flowRegeneration enable
```

3.5.4.17 clear lacp flowRegeneration

Use this command to reset LACP flow regeneration to its default state (disabled).

clear lacp flowRegeneration

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset LACP flow regeneration to disabled:

```
Matrix(rw)->clear lacp flowRegeneration
```

3.5.4.18 show lacp outportAlgorithm

Use this command to display the current LACP outport algorithm.

show lacp outportAlgorithm

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the current LACP outport algorithm:

```
Matrix(rw)->show lacp outportAlgorithm
dip-sip
```

3.5.4.19 set lacp outportAlgorithm

Use this command to set the algorithm LACP will use for outport determination.

set lacp outportAlgorithm {dip-sip | da-sa | round-robin}

Syntax Description

dip-sip	Specifies that destination and source IP addresses will determine the LACP outport.
da-sa	Specifies that destination and source MAC addresses will determine the LACP outport.
round-robin	Specifies that the round-robin algorithm will determine the LACP outport.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the LACP outport algorithm to DA-SA:

```
Matrix(rw)->set lacp outportalgorithm da-sa
```

3.5.4.20 clear lacp outportAlgorithm

Use this command to reset LACP to DIP-SIP, its default outport algorithm.

clear lacp outportAlgorithm

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the LACP outport algorithm to DIP-SIP:

```
Matrix(rw)->clear lacp outportAlgorithm
```

4

SNMP Configuration

This chapter describes the Simple Network Management Protocol (SNMP) set of commands and how to use them.

4.1 SNMP CONFIGURATION SUMMARY

SNMP is an application-layer protocol that facilitates the exchange of management information between network devices. SNMP enables network administrators to manage network performance, find and solve network problems, and plan for network growth.

Matrix Series devices support three versions of SNMP:

- Version 1 (SNMPv1) — This is the initial implementation of SNMP. Refer to RFC 1157 for a full description of functionality.
- Version 2 (SNMPv2c) — The second release of SNMP, described in RFC 1907, has additions and enhancements to data types, counter size, and protocol operations.
- Version 3 (SNMPv3) — This is the most recent version of SNMP, and includes significant enhancements to administration and security. SNMPv3 is fully described in RFC 2571, RFC 2572, RFC 2573, RFC 2574, and RFC 2575.

4.1.1 SNMPv1 and SNMPv2c

The components of SNMPv1 and SNMPv2c network management fall into three categories:

- Managed devices (such as a switch)
- SNMP agents and MIBs, including SNMP traps, community strings, and Remote Monitoring (RMON) MIBs, which run on managed devices
- SNMP network management applications, such as Enterasys Networks' NetSight Atlas, which communicate with agents to get statistics and alerts from the managed devices.

4.1.2 SNMPv3

SNMPv3 is an interoperable standards-based protocol that provides secure access to devices by authenticating and encrypting frames over the network. The advanced security features provided in SNMPv3 are as follows:

- Message integrity — Collects data securely without being tampered with or corrupted.
- Authentication — Determines the message is from a valid source.
- Encryption — Scrambles the contents of a frame to prevent it from being seen by an unauthorized source.

Unlike SNMPv1 and SNMPv2c, in SNMPv3, the concept of SNMP agents and SNMP managers no longer apply. These concepts have been combined into an SNMP entity. An SNMP entity consists of an SNMP engine and SNMP applications. An SNMP engine consists of the following four components:

- Dispatcher — This component sends and receives messages.
- Message processing subsystem — This component accepts outgoing PDUs from the dispatcher and prepares them for transmission by wrapping them in a message header and returning them to the dispatcher. The message processing subsystem also accepts incoming messages from the dispatcher, processes each message header, and returns the enclosed PDU to the dispatcher.
- Security subsystem — This component authenticates and encrypts messages.
- Access control subsystem — This component determines which users and which operations are allowed access to managed objects.

4.1.3 About SNMP Security Models and Levels

An SNMP security model is an authentication strategy that is set up for a user and the group in which the user resides. A security level is the permitted level of security within a security model. The three levels of SNMP security are: No authentication required (NoAuthNoPriv); authentication required (AuthNoPriv); and privacy (authPriv). A combination of a security model and a security level determines which security mechanism is employed when handling an SNMP frame. Table 4-1 identifies the levels of SNMP security available on Matrix Series devices and authentication required within each model.

Table 4-1 SNMP Security Levels

Model	Security Level	Authentication	Encryption	How It Works
v1	NoAuthNoPriv	Community string	None	Uses a community string match for authentication.
v2c	NoAuthNoPriv	Community string	None	Uses a community string match for authentication.
v3	NoAuthNoPriv	User name	None	Uses a user name match for authentication.
	AuthNoPriv	MD5 or SHA	None	Provides authentication based on the HMAC-MD5 or HMAC-SHA algorithms.
	authPriv	MD5 or SHA	DES	Provides authentication based on the HMAC-MD5 or HMAC-SHA algorithms. Provides DES 56-bit encryption in addition to authentication based on the CBC-DES (DES-56) standard.

4.1.4 Using SNMP Contexts to Access Specific MIBs or Routing Modules

By default, when operating from the switch CLI, Matrix Series devices allow access to all SNMP MIBs or contexts. A context is a collection of MIB objects, often associated with a particular physical or logical device.

If no optional *context* parameters are configured for v1 and v2 “community” names and v3 “user” groups, these groups are able to access all SNMP MIB objects when in switch mode.

Specifying a *context* parameter when setting up SNMP user group access would either:

- Permit or restrict the group’s switch management access to the MIB(s) specified by the *context* (MIB object ID) value, or
- Allow the group to have SNMP management access to one or more router modules when operating in router mode.

All SNMP contexts known to the device can be displayed using the **show snmp context** command as described in Section 4.3.4.2.

Examples

This example permits the "powergroup" to manage all MIBs via SNMPv3:

```
Matrix(rw)->set snmp access powergroup security-model usm
```

This example grants the "powergroup" SNMPv3 management access from all router modules when operating in router mode:

```
Matrix(rw)->set snmp access powergroup security-model usm context router prefix
```

This example grants the "powergroup" SNMPv3 management access from the router running on module 1 when operating in router mode:

```
Matrix(rw)->set snmp access powergroup security-model usm context router1 exact
```

For information on preparing the device for router mode, refer back to Section 2.3.

4.2 PROCESS OVERVIEW: SNMP CONFIGURATION

NOTE: Commands for configuring SNMP on the Matrix Series device are independent during the SNMP setup process. For instance, target parameters can be specified when setting up optional notification filters — even though these parameters have not yet been created with the **set snmp targetparams** command. The following steps are a guideline to configuring SNMP and do not necessarily need to be executed in this order.

Use the following steps as a guide to configuring SNMP on the device:

1. Reviewing SNMP statistics (Section 4.3.1)
2. Configuring SNMP users, groups and communities (Section 4.3.2)
3. Configuring SNMP access rights (Section 4.3.3)
4. Configuring SNMP MIB views (Section 4.3.4)
5. Configuring SNMP target parameters (Section 4.3.5)
6. Configuring SNMP target addresses (Section 4.3.6)
7. Configuring SNMP notification parameters (Section 4.3.7)
8. Creating a basic SNMP trap notification (Section 4.3.8)

4.3 SNMP CONFIGURATION COMMAND SET

4.3.1 Reviewing SNMP Statistics

Purpose

To review SNMP statistics.

Commands

The commands used to review SNMP statistics are listed below and described in the associated section as shown.

- show snmp engineid (Section 4.3.1.1)
- show snmp counters (Section 4.3.1.2)

4.3.1.1 show snmp engineid

Use this command to display the SNMP local engine ID. This is the SNMP v3 engine's administratively unique identifier.

show snmp engineid

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP engine properties:

```
Matrix(rw)->show snmp engineid
EngineId: 80:00:15:f8:03:00:e0:63:9d:b5:87
Engine Boots    = 12
Engine Time     = 162181
Max Msg Size    = 2048
```

Table 4-2 shows a detailed explanation of the command output.

Table 4-2 show snmp engineid Output Details

Output	What It Displays...
EngineId	String identifying the SNMP agent on the device.
Engine Boots	Number of times the SNMP engine has been started or reinitialized.
Engine Time	Time in seconds since last reboot.
Max Msg Size	Maximum accepted length, in bytes, of SNMP frame.

4.3.1.2 show snmp counters

Use this command to display SNMP traffic counter values.

show snmp counters

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP counter values

```
Matrix(rw)->show snmp counters

--- mib2 SNMP group counters:
snmpInPkts               = 396601
snmpOutPkts              = 396601
snmpInBadVersions        = 0
snmpInBadCommunityNames  = 0
snmpInBadCommunityUses   = 0
snmpInASNParseErrs       = 0
snmpInTooBigs            = 0
snmpInNoSuchNames        = 0
snmpInBadValues          = 0
snmpInReadOnlys          = 0
snmpInGenErrs            = 0
snmpInTotalReqVars       = 403661
snmpInTotalSetVars       = 534
snmpInGetRequests        = 290
snmpInGetNexts           = 396279
snmpInSetRequests        = 32
snmpInGetResponses       = 0
snmpInTraps              = 0
snmpOutTooBigs           = 0
snmpOutNoSuchNames       = 11
snmpOutBadValues         = 0
snmpOutGenErrs           = 0
snmpOutGetRequests       = 0
snmpOutGetNexts          = 0
snmpOutSetRequests       = 0
snmpOutGetResponses      = 396601
snmpOutTraps             = 0
snmpSilentDrops          = 0
snmpProxyDrops           = 0

--- USM Stats counters:
usmStatsUnsupportedSecLevels = 0
usmStatsNotInTimeWindows     = 0
usmStatsUnknownUserNames     = 0
usmStatsUnknownEngineIDs     = 0
usmStatsWrongDigests         = 0
usmStatsDecryptionErrors     = 0
```

Table 4-3 shows a detailed explanation of the command output.

Table 4-3 show snmp counters Output Details

Output	What It Displays...
snmpInPkts	Number of messages delivered to the SNMP entity from the transport service.
snmpOutPkts	Number of SNMP messages passed from the SNMP protocol entity to the transport service.
snmpInBadVersions	Number of SNMP messages delivered to the SNMP entity for an unsupported SNMP version.
snmpInBadCommunityNames	Number of SNMP messages delivered to the SNMP entity that used an SNMP community name not known to the entity.
snmpInBadCommunityUses	Number of SNMP messages delivered to the SNMP entity that represented an SNMP operation not allowed by the SNMP community named in the message.
snmpInASNParseErrs	Number of ASN.1 (Abstract Syntax Notation) or BER (Basic Encoding Rules) errors encountered by the SNMP entity when decoding received SNMP messages.
snmpInTooBigs	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as “tooBig.”
snmpInNoSuchNames	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as “noSuchName.”
snmpInBadValues	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as “badValue.”
snmpInReadOnlys	Number of valid SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as “readOnly.”
snmpInGenErrs	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as “genErr.”

Table 4-3 show snmp counters Output Details (Continued)

Output	What It Displays...
snmpInTotalReqVars	Number of MIB objects retrieved successfully by the SNMP protocol entity as the result of receiving valid SNMP Get-Request and Get-Next PDUs.
snmpInTotalSetVars	Number of MIB objects altered successfully by the SNMP protocol entity as the result of receiving valid SNMP Set-Request PDUs.
snmpInGetRequests	Number of SNMP Get-Request PDUs accepted and processed by the SNMP protocol entity.
snmpInGetNexts	Number of SNMP Get-Next PDUs accepted and processed by the SNMP protocol entity.
snmpInSetRequests	Number of SNMP Set-Request PDUs accepted and processed by the SNMP protocol entity.
snmpInGetResponses	Number of SNMP Get-Response PDUs accepted and processed by the SNMP protocol entity.
snmpInTraps	Number of SNMP Trap PDUs accepted and processed by the SNMP protocol entity.
snmpOutTooBigs	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status field as “tooBig.”
snmpOutNoSuchNames	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status as “noSuchName.”
snmpOutBadValues	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status field as “badValue.”
snmpOutGenErrs	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status field as “genErr.”
snmpOutGetRequests	Number of SNMP Get-Request PDUs generated by the SNMP protocol entity.

Table 4-3 show snmp counters Output Details (Continued)

Output	What It Displays...
snmpOutGetNexts	Number of SNMP Get-Next PDUs generated by the SNMP protocol entity.
snmpOutSetRequests	Number of SNMP Set-Request PDUs generated by the SNMP protocol entity.
snmpOutGetResponses	Number of SNMP Get-Response PDUs generated by the SNMP protocol entity.
snmpOutTraps	Number of SNMP Trap PDUs generated by the SNMP protocol entity.
snmpSilentDrops	Number of SNMP Get, Set, or Inform request error messages that were dropped because the reply was larger than the requestor's maximum message size.
snmpProxyDrops	Number of SNMP Get, Set, or Inform request error messages that were dropped because the reply was larger than the proxy target's maximum message size.
usmStatsUnsupportedSec Levels	Number of packets received by the SNMP engine that were dropped because they requested a security level that was unknown to the SNMP engine or otherwise unavailable.
usmStatsNotInTimeWindows	Number of packets received by the SNMP engine that were dropped because they appeared outside of the authoritative SNMP engine's window.
usmStatsUnknownUserNames	Number of packets received by the SNMP engine that were dropped because they referenced a user that was not known to the SNMP engine.
usmStatsUnknownEngineIDs	Number of packets received by the SNMP engine that were dropped because they referenced an snmpEngineID that was not known to the SNMP engine.

Table 4-3 show snmp counters Output Details (Continued)

Output	What It Displays...
usmStatsWrongDigests	Number of packets received by the SNMP engine that were dropped because they did not contain the expected digest value.
usmStatsDecriptionErrors	Number of packets received by the SNMP engine that were dropped because they could not be decrypted.

4.3.2 Configuring SNMP Users, Groups and Communities

Purpose

To review and configure SNMP users, groups and v1 and v2 communities. These are defined as follows:

- User — A person registered in SNMPv3 to access SNMP management.
- Group — A collection of users who share the same SNMP access privileges.
- Community — A name used to authenticate SNMPv1 and v2 users.

Commands

The commands used to review and configure SNMP users, groups and communities are listed below and described in the associated section as shown.

- show snmp user (Section 4.3.2.1)
- set snmp user (Section 4.3.2.2)
- clear snmp user (Section 4.3.2.3)
- show snmp group (Section 4.3.2.4)
- set snmp group (Section 4.3.2.5)
- clear snmp group (Section 4.3.2.6)
- show snmp community (Section 4.3.2.7)
- set snmp community (Section 4.3.2.8)
- clear snmp community (Section 4.3.2.9)

4.3.2.1 show snmp user

Use this command to display information about SNMP users. These are people registered to access SNMP management.

show snmp user [**list**] | [*user*] | [**remote** *remote*] [**volatile** | **nonvolatile** | **read-only**]

Syntax Description

list	(Optional) Displays a list of registered SNMP user names.
user	(Optional) Displays information about a specific user.
remote *remote*	(Optional) Displays information about users on a specific remote SNMP engine.
volatile | **nonvolatile** | **read-only**	(Optional) Displays user information for a specified storage type.

Command Defaults

- If **list** is not specified, detailed SNMP information will be displayed.
- If *user* is not specified, information about all SNMP users will be displayed.
- If **remote** is not specified, user information about the local SNMP engine will be displayed.
- If not specified, user information for all storage types will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display an SNMP user list:

```
Matrix(rw)->show snmp user list
--- SNMP user information ---
--- List of registered users:
Guest
admin1
admin2
netops
```

This example shows how to display information for the SNMP “guest” user:

```
Matrix(rw)->show snmp user guest
--- SNMP user information ---
EngineId:  00:00:00:63:00:00:00:a1:00:00:00:00
Username                = Guest
Auth protocol           = usmNoAuthProtocol
Privacy protocol        = usmNoPrivProtocol
Storage type            = nonVolatile
Row status              = active
```

Table 4-4 shows a detailed explanation of the command output.

Table 4-4 show snmp user Output Details

Output	What It Displays...
EngineId	SNMP local engine identifier.
Username	SNMPv1 or v2 community name or SNMPv3 user name.
Auth protocol	Type of authentication protocol applied to this user.
Privacy protocol	Whether a privacy protocol is applied when authentication protocol is in use.
Storage type	Whether entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

4.3.2.2 set snmp user

Use this command to create a new SNMPv3 user.

set snmp user *user* [**remote** *remoteid*] [**authentication** {**md5** | **sha**}] [*authpassword*] [**privacy** *privpassword*] [**volatile** | **nonvolatile**]

Syntax Description

user	Specifies a name for the SNMPv3 user.
remote *remoteid*	(Optional) Registers the user on a specific remote SNMP engine.
authentication md5 | **sha**	(Optional) Specifies the authentication type required for this user as MD5 or SHA.
authpassword	(Optional) Specifies a password for this user when authentication is required. Minimum of 8 characters.
privacy *privpassword*	(Optional) Applies encryption and specifies an encryption password. Minimum of 8 characters
volatile | **nonvolatile**	(Optional) Specifies a storage type for this user entry.

Command Defaults

- If **remote** is not specified, the user will be registered for the local SNMP engine.
- If **authentication** is not specified, no authentication will be applied.
- If **privacy** is not specified, no encryption will be applied.
- If storage type is not specified, **nonvolatile** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create a new SNMP user named “netops**”.** By default, this user will be registered on the local SNMP engine without authentication and encryption. Entries related to this user will be stored in permanent (nonvolatile) memory:

```
Matrix(rw)->set snmp user netops
```

4.3.2.3 clear snmp user

Use this command to remove a user from the SNMPv3 security-model list.

clear snmp user *user* [**remote** *remote*]

Syntax Description

user	Specifies an SNMPv3 user to remove.
remote *remote*	(Optional) Removes the user from a specific remote SNMP engine.

Command Defaults

If **remote** is not specified, the user will be removed from the local SNMP engine.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove the SNMP user named "bill**"**:

```
Matrix(rw)->clear snmp user bill
```

4.3.2.4 show snmp group

Use this command to display an SNMP group configuration. An SNMP group is a collection of SNMPv3 users who share the same access privileges.

show snmp group [**groupname** *groupname*] [**user** *user*] [**security-model** {**v1** | **v2c** | **usm**}] [**volatile** | **nonvolatile** | **read-only**]

Syntax Description

groupname *groupname*	(Optional) Displays information for a specific SNMP group.
user *user*	(Optional) Displays information about users within the specified group.
security-model v1 | **v2c** | **usm**	(Optional) Displays information about groups assigned to a specific security SNMP model.
volatile | **nonvolatile** | **read-only**	(Optional) Displays SNMP group information for a specified storage type.

Command Defaults

- If *groupname* is not specified, information about all SNMP groups will be displayed.
- If *user* is not specified, information about all SNMP users will be displayed.
- If **security-model** is not specified, user information about all SNMP versions will be displayed.
- If not specified, information for all storage types will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP group information:

```
Matrix(rw)->show snmp group
--- SNMP group information ---
Security model          = SNMPv1
Security/user name      = public
Group name              = Anyone
Storage type            = nonVolatile
Row status              = active

Security model          = SNMPv1
Security/user name      = public.router1
Group name              = Anyone
Storage type            = nonVolatile
Row status              = active
```

Table 4-5 shows a detailed explanation of the command output.

Table 4-5 show snmp group Output Details

Output	What It Displays...
Security model	SNMP version associated with this group.
Security/user name	User belonging to the SNMP group.
Group name	Name of SNMP group.
Storage type	Whether entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

4.3.2.5 set snmp group

Use this command to create an SNMP group. This associates SNMPv3 users to a group that shares common access privileges.

set snmp group *groupname* **user** *user* **security-model** {**v1** | **v2c** | **usm**} [**volatile** | **nonvolatile**]

Syntax Description

groupname	Specifies an SNMP group name to create.
user *user*	Specifies an SNMPv3 user name to assign to the group.
security-model v1 | **v2c** | **usm**	Specifies an SNMP security model to assign to the group.
volatile | **nonvolatile**	(Optional) Specifies a storage type for SNMP entries associated with the group.

Command Defaults

If storage type is not specified, **nonvolatile** storage will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create an SNMP group called “anyone”, assign a user named “public” and assign SNMPv3 security to the group:

```
Matrix(rw)->set snmp group anyone user public security-model usm
```

4.3.2.6 clear snmp group

Use this command to clear SNMP group settings globally or for a specific SNMP group and user.

clear snmp group *groupname user* [**security-model** {**v1** | **v2c** | **usm**}]

Syntax Description

groupname	Specifies the SNMP group to be cleared.
user	Specifies the SNMP user to be cleared.
security-model v1 | **v2c** | **usm**	(Optional) Clears the settings associated with a specific security model.

Command Defaults

If not specified, settings related to all security models will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all settings assigned to the “public” user within the SNMP group “anyone”:

```
Matrix(rw)->clear snmp group anyone public
```

4.3.2.7 show snmp community

Use this command to display SNMP community names and status. In SNMPv1 and v2, community names act as passwords to remote management.

show snmp community [*name*]

Syntax Description

name	(Optional) Displays SNMP information for a specific community name.

Command Defaults

If *name* is not specified, information will be displayed for all SNMP communities.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display information about the SNMP "public" community name. For a description of this output, refer to **set snmp community** (Section 4.3.2.8):

```
Matrix(rw)->show snmp community public

--- Configured community strings ---

Name            = public
Security name   = public
Context         =
Transport tag   =
Storage type    = nonVolatile
Status          = active
```

4.3.2.8 set snmp community

Use this command to configure an SNMP community group.

set snmp community *community* [**securityname** *securityname*] [**context** *context*] [**transport** *transport*] [**volatile** | **nonvolatile**]

Syntax Description

community	Specifies a community group name.
securityname *securityname*	(Optional) Specifies an SNMP security name to associate with this community.
context *context*	(Optional) Specifies a subset of management information this community will be allowed to access. Valid values are full or partial context names. To review all contexts configured for the device, use the **show snmp context** command as described in Section 4.3.4.2. **NOTE:** A routing module must be specified as a *context* to allow for SNMP management when operating in router mode.
transport *transport*	(Optional) Specifies the set of transport endpoints from which SNMP request with this community name will be accepted. Makes a link to a target address table.
volatile | **nonvolatile**	(Optional) Specifies the storage type for these entries.

Command Defaults

None.

- If **securityname** is not specified, the *community* name will be used.
- If **context** is not specified, access will be granted for the default context.
- If **transport** tag is not specified, none will be applied.
- If storage type is not specified, **nonvolatile** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set an SNMP community name called “vip”:

```
Matrix(rw)->set snmp community vip
```

This example shows how to grant SNMP management privileges to “vip” community from routing module 1 when operating in router mode:

```
Matrix(rw)->set snmp community vip context module1
```

4.3.2.9 clear snmp community

Use this command to delete an SNMP community name.

clear snmp community *name*

Syntax Description

name	Specifies the SNMP community name to clear.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete the community name “vip.”

```
Matrix(rw)->clear snmp community vip
```

4.3.3 Configuring SNMP Access Rights

Purpose

To review and configure SNMP access rights, assigning viewing privileges and security levels to SNMP user groups.

Commands

The commands used to review and configure SNMP access are listed below and described in the associated section as shown.

- show snmp access (Section 4.3.3.1)
- set snmp access (Section 4.3.3.2)
- clear snmp access (Section 4.3.3.3)

4.3.3.1 show snmp access

Use this command to display access rights and security levels configured for SNMP one or more groups.

show snmp access [*groupname*] **[security-model {v1 | v2c | usm}] [noauthentication | authentication | privacy]** [**context** *context*] [**volatile** | **nonvolatile** | **read-only**]

Syntax Description

groupname	(Optional) Displays access information for a specific SNMPv3 group.
security-model v1 | v2c | usm	(Optional) Displays access information for SNMP security model version 1, 2c or 3 (usm).
noauthentication | authentication | privacy	(Optional) Displays access information for a specific security level.
context *context*	(Optional) Displays access information for a specific context. For a description of how to specify SNMP contexts, refer to Section 4.1.4.
volatile | nonvolatile | read-only	(Optional) Displays access entries for a specific storage type.

Command Defaults

- If *groupname* is not specified, access information for all SNMP groups will be displayed.
- If **security-mode**l is not specified, access information for all SNMP versions will be displayed.
- If **noauthentication**, **authentication** or **privacy** are not specified, access information for all security levels will be displayed.
- If **context** is not specified, all contexts will be displayed.
- If **volatile**, **nonvolatile** or **read-only** are not specified, all entries of all storage types will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP access information:

```
Matrix(rw)->show snmp access
Group           = SystemAdmin
Security model  = USM
Security level  = noAuthNoPriv
Read View       = All
Write View      =
Notify View     = All
Context match   = exact match
Storage type    = nonVolatile
Row status      = active

Group           = NightOperator
Security model  = USM
Security level  = noAuthNoPriv
Read View       = All
Write View      =
Notify View     = All
Context match   = exact match
Storage type    = nonVolatile
Row status      = active
```

Table 4-6 shows a detailed explanation of the command output.

Table 4-6 show snmp access Output Details

Output	What It Displays...
Group	SNMP group name.
Security model	Security model applied to this group. Valid types are: **SNMPv1**, **SNMPv2c**, and SNMPv3 (User based - **USM**).

Table 4-6 show snmp access Output Details (Continued)

Output	What It Displays...
Security level	Security level applied to this group. Valid levels are: • noAuthNoPrivacy (**no authentication** required) • AuthNoPrivacy (**authentication** required) • authPriv (**privacy** -- most secure level)
Read View	Name of the view that allows this group to view SNMP MIB objects.
Write View	Name of the view that allows this group to configure the contents of the SNMP agent.
Notify View	Name of the view that allows this group to send an SNMP trap message.
Context match	Whether or not SNMP context match must be exact (full context name match) or a partial match with a given prefix.
Storage type	Whether access entries for this group are stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

4.3.3.2 set snmp access

Use this command to set an SNMP access configuration.

set snmp access *groupname* **security-model** {**v1** | **v2c** | **usm**} [**noauthentication** | **authentication** | **privacy**] [**context** *context*] [**exact** | **prefix**] [**read** *read*] [**write** *write*] [**notify** *notify*] [**volatile** | **nonvolatile**]

Syntax Description

groupname	Specifies a name for an SNMPv3 group.
security-model v1 | v2c | usm	Specifies SNMP version 1, 2c or 3 (usm).
noauthentication | authentication | privacy	(Optional) Applies SNMP security level as no authentication, authentication (without privacy) or privacy. Privacy specifies that messages sent on behalf of the user are protected from disclosure.
context *context* **exact** | **prefix**	(Optional) Sets the context for this access configuration and specifies that the match must be exact (matching the whole context string) or a prefix match only. Context is a subset of management information this SNMP group will be allowed to access. Valid values are full or partial context names. To review all contexts configured for the device, use the **show snmp context** command as described in Section 4.3.4.2. **NOTE:** A routing module must be specified as a *context* to allow for SNMP management when operating in router mode.
read *read*	(Optional) Specifies a read access view.
write *write*	(Optional) Specifies a write access view.
notify *notify*	(Optional) Specifies a notify access view.
volatile | nonvolatile | read-only	(Optional) Stores associated SNMP entries as temporary or permanent, or read-only.

Command Defaults

- If security level is not specified, no authentication will be applied.
- If **context** is not specified, access will be enabled for the default context. If **context** is specified without a context match, **exact** match will be applied.
- If **read** view is not specified none will be applied.
- If **write** view is not specified, none will be applied.
- If **notify** view is not specified, none will be applied.
- If storage type is not specified, entries will be stored as permanent and will be held through device reboot.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example permits the “powergroup” to manage all MIBs via SNMPv3:

```
Matrix(rw)->set snmp access powergroup security-model usm
```

This example grants the “powergroup” SNMPv3 management access from all router modules when operating in router mode:

```
Matrix(rw)->set snmp access powergroup security-model usm context router prefix
```

4.3.3.3 clear snmp access

Use this command to clear the SNMP access entry of a specific group, including its set SNMP security-model, and level of security.

clear snmp access *groupname* **security-model** {**v1** | **v2c** | **usm**} [**noauthentication** | **authentication** | **privacy**] [**context** *context*]

Syntax Description

groupname	Specifies the name of the SNMP group for which to clear access.
security-model v1 | v2c | usm	Specifies the security model to be cleared for the SNMP access group.
noauthentication | authentication | privacy	(Optional) Clears a specific security level for the SNMP access group.
context *context*	(Optional) Clears a specific context for the SNMP access group. Enter / - / to clear the default context.

Command Defaults

- If security level is not specified, all levels will be cleared.
- If **context** is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear SNMP version 3 access for the “mis-group” via the authentication protocol:

```
Matrix(rw)->clear snmp access mis-group security-model usm authentication
```

4.3.4 Configuring SNMP MIB Views

Purpose

To review and configure SNMP MIB views. SNMP views map SNMP objects to access rights.

Commands

The commands used to review and configure SNMP MIB views are listed below and described in the associated section as shown.

- show snmp view (Section 4.3.4.1)
- show snmp context (Section 4.3.4.2)
- set snmp view (Section 4.3.4.3)
- clear snmp view (Section 4.3.4.4)

4.3.4.1 show snmp view

Use this command to display the MIB configuration for SNMPv3 view-based access (VACM).

show snmp view [*viewname*] [**subtree** *oid-or-mibobject*] [**volatil**e | **nonvolatile** | **read-only**]

Syntax Description

viewname	(Optional) Displays information for a specific MIB view.
subtree *oid-or-mibobject*	(Optional) Displays information for a specific MIB subtree when *viewname* is specified.
volatile | **nonvolatile** | **read-only**	(Optional) Displays entries for a specific storage type.

Command Defaults

If no parameters are specified, all SNMP MIB view configuration information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP MIB view configuration information:

```
Matrix(rw)->show snmp view

 --- SNMP MIB View information ---
View Name        = All
Subtree OID      = 1
Subtree mask     =
View Type        = included
Storage type     = nonVolatile
Row status       = active

View Name        = All
Subtree OID      = 0.0
Subtree mask     =
View Type        = included
Storage type     = nonVolatile
Row status       = active

View Name        = Network
Subtree OID      = 1.3.6.1.2.1
Subtree mask     =
View Type        = included
Storage type     = nonVolatile
Row status       = active
```

Table 4-7 provides an explanation of the command output. For details on using the **set snmp view** command to assign variables, refer to Section 4.3.4.3.

Table 4-7 show snmp view Output Details

Output	What It Displays...
View Name	Name assigned to a MIB view.
Subtree OID	Name identifying a MIB subtree.
Subtree mask	Bitmask applied to a MIB subtree.
View Type	Whether or not subtree use must be **included** or **excluded** for this view.
Storage type	Whether storage is in **nonVolatile** or **Volatile** memory
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

4.3.4.2 show snmp context

Use this command to display the context list configuration for SNMP's view-based access control. An SNMP context is a collection of management information that can be accessed by an SNMP agent or entity. The default context allows all SNMP agents to access all management information (MIBs). When created using the **set snmp access** command (Section 4.3.3.2), other contexts can be applied to limit access to a subset of management information and to permit SNMP access from one or more routing modules.

show snmp context

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display a list of all SNMP contexts known to the device:

```
Matrix(rw)->show snmp context

--- Configured contexts:
default context (all mibs)
router2
router3
```

4.3.4.3 set snmp view

Use this command to set a MIB configuration for SNMPv3 view-based access (VACM).

set snmp view viewname *viewname* **subtree** *subtree* [**mask** *mask*] [**included** | **excluded**] [**volatile** | **nonvolatile**]

Syntax Description

viewname *viewname*	Specifies a name for a MIB view.
subtree *subtree*	Specifies a MIB subtree name.
mask *mask*	(Optional) Specifies a bitmask for a subtree.
included | **excluded**	(Optional) Specifies subtree use (default) or no subtree use.
volatile | **nonvolatile**	(Optional) Specifies the use of temporary or permanent (default) storage.

Command Defaults

- If not specified, **mask** will be set to **255.255.255.255**
- If not specified, subtree use will be **included**.
- If storage type is not specified, **nonvolatile** (permanent) will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set an SNMP MIB view to “public” with a subtree name of 1.3.6.1 included:

```
Matrix(rw)->set snmp view viewname public subtree 1.3.6.1 included
```

4.3.4.4 clear snmp view

Use this command to delete an SNMPv3 MIB view.

clear snmp view *viewname subtree*

Syntax Description

viewname	Specifies the MIB view name to be deleted.
subtree	Specifies the subtree name of the MIB view to be deleted.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete SNMP MIB view “public”:

```
Matrix(rw)->clear snmp view public 1.3.6.1
```

4.3.5 Configuring SNMP Target Parameters

Purpose

To review and configure SNMP target parameters. This controls where and under what circumstances SNMP notifications will be sent. A target parameter entry can be bound to a target IP address allowed to receive SNMP notification messages with the **set snmp targetaddr** command (Section 4.3.6.2)

Commands

The commands used to review and configure SNMP target parameters are listed below and described in the associated section as shown.

- show snmp targetparams (Section 4.3.5.1)
- set snmp targetparams (Section 4.3.5.2)
- clear snmp targetparams (Section 4.3.5.3)

4.3.5.1 show snmp targetparams

Use this command to display SNMP parameters used to generate a message to a target.

show snmp targetparams [*targetParams*] [**volatile** | **nonvolatile** | **read-only**]

Syntax Description

targetParams	(Optional) Displays entries for a specific target parameter.
volatile | **nonvolatile** | **read-only**	(Optional) Displays target parameter entries for a specific storage type.

Command Defaults

- If *targetParams* is not specified, entries associated with all target parameters will be displayed.
- If not specified, entries of all storage types will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP target parameters information:

```
Matrix(rw)->show snmp targetparams

--- SNMP TargetParams information ---
Target Parameter Name   = v1ExampleParams
Security Name           = public
Message Proc. Model     = SNMPv1
Security Level          = noAuthNoPriv
Storage type            = nonVolatile
Row status              = active

Target Parameter Name   = v2cExampleParams
Security Name           = public
Message Proc. Model     = SNMPv2c
Security Level          = noAuthNoPriv
Storage type            = nonVolatile
Row status              = active

Target Parameter Name   = v3ExampleParams
Security Name           = CharlieDChief
Message Proc. Model     = USM
Security Level          = authNoPriv
Storage type            = nonVolatile
Row status              = active
```

Table 4-8 shows a detailed explanation of the command output.

Table 4-8 show snmp targetparams Output Details

Output	What It Displays...
Target Parameter Name	Unique identifier for the parameter in the SNMP target parameters table. Maximum length is 32 bytes.
Security Name	Security string definition.
Message Proc. Model	SNMP version.
Security Level	Type of security level (**auth**: security level is set to use authentication protocol, **noauth**: security level is not set to use authentication protocol, or **privacy**).

Table 4-8 show snmp targetparams Output Details (Continued)

Output	What It Displays...
Storage type	Whether entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

4.3.5.2 set snmp targetparams

Use this command to set SNMP target parameters, a named set of security/authorization criteria used to generate a message to a target.

set snmp targetparams *paramsname* **user** *user* **security-model** {**v1** | **v2c** | **usm}** **message-processing** {**v1 | v2c | v3}** [**noauthentication** | **authentication** | **privacy**] [**volatile | nonvolatile**]

Syntax Description

paramsname	Specifies a name identifying parameters used to generate SNMP messages to a particular target.
user *user*	Specifies an SNMPv1 or v2 community name or an SNMPv3 user name. Maximum length is 32 bytes.
security-model v1 | v2c | usm	Specifies the SNMP security model applied to this target parameter as version 1, 2c or 3 (usm).
message-processing v1 | v2c | v3	Specifies the SNMP message processing model applied to this target parameter as version 1, 2c or 3.
noauthentication | authentication | privacy	(Optional) Specifies the SNMP security level applied to this target parameter as no authentication, authentication (without privacy) or privacy. Privacy specifies that messages sent on behalf of the user are protected from disclosure.
volatile | nonvolatile	(Optional) Specifies the storage type applied to this target parameter.

Command Defaults

None.

- If not specified, security level will be set to **noauthentication.**
- If not specified, storage type will be set to **nonvolatile**.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set SNMP target parameters named “v1ExampleParams” for a user named “fred” using version 3 security model and message processing, and authentication*:*

```
Matrix(rw)->set snmp targetparams v1ExampleParams user fred security-model usm
message-processing v3 authentication
```

4.3.5.3 clear snmp targetparams

Use this command to clear the SNMP target parameter configuration.

clear snmp targetparams *targetParams*

Syntax Description

targetParams	Specifies the name of the parameter in the SNMP target parameters table to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear SNMP target parameters named “v1ExampleParams”:

```
Matrix(rw)->clear snmp targetparams v1ExampleParams
```

4.3.6 Configuring SNMP Target Addresses

Purpose

To review and configure SNMP target addresses which will receive SNMP notification messages. An address configuration can be linked to optional SNMP transmit, or target, parameters (such as timeout, retry count, and UDP port) set with the **set snmp targetparams** command (Section 4.3.5.2).

Commands

The commands used to review and configure SNMP target addresses are listed below and described in the associated section as shown.

- show snmp targetaddr (Section 4.3.6.1)
- set snmp targetaddr (Section 4.3.6.2)
- clear snmp targetaddr (Section 4.3.6.3)

4.3.6.1 show snmp targetaddr

Use this command to display SNMP target address information.

show snmp targetaddr [*targetAddr*] [**volatile** | **nonvolatile** | **read-only**]

Syntax Description

targetAddr	(Optional) Displays information for a specific target address name.
volatile | **nonvolatile** | **read-only**	(Optional) When target address is specified, displays target address information for a specific storage type.

Command Defaults

- If *targetAddr* is not specified, entries for all target address names will be displayed.
- If not specified, entries of all storage types will be displayed for a target address.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP target address information:

```
Matrix(rw)->show snmp targetaddr
Target Address Name     = labmachine
Tag List                = v2cTrap
IP Address              = 10.2.3.116
UDP Port#               = 162
Target Mask             = 255.255.255.255
Timeout                 = 1500
Retry count             = 4
Parameters              = v2cParams
Storage type            = nonVolatile
Row status              = active
```

Table 4-9 shows a detailed explanation of the command output.

Table 4-9 show snmp targetaddr Output Details

Output	What It Displays...
Target Address Name	Unique identifier in the snmpTargetAddressTable.
Tag List	Tags a location to the target address as a place to send notifications.
IP Address	Target IP address.
UDP Port#	Number of the UDP port of the target host to use.
Target Mask	Target IP address mask.
Timeout	Timeout setting for the target address.
Retry count	Retry setting for the target address.
Parameters	Entry in the snmpTargetParamsTable.
Storage type	Whether entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

4.3.6.2 set snmp targetaddr

Use this command to configure an SNMP target address. The target address is a unique identifier and a specific IP address that will receive SNMP notification messages and determine which community strings will be accepted. This address configuration can be linked to optional SNMP transmit parameters (such as timeout, retry count, and UDP port).

set snmp targetaddr *targetaddr ipaddr* **param** *param* **[udpport** *udpport*] **[mask** *mask*] **[timeout** *timeout*] **[retries** *retries*] **[taglist** *taglist*] **[volatile** | **nonvolatile**]

Syntax Description

targetaddr	Specifies a unique identifier to index the snmpTargetAddrTable. Maximum length is 32 bytes.
ipaddr	Specifies the IP address of the target.
param *param*	Specifies an entry in the SNMP target parameters table, which is used when generating a message to the target. Maximum length is 32 bytes.
udpport *udpport*	(Optional) Specifies which UDP port of the target host to use.
mask *mask*	(Optional) Specifies the IP mask of the target.
timeout *timeout*	(Optional) Specifies the maximum round trip time allowed to communicate to this target address. This value is in .01 seconds and the default is 1500 (15 seconds.)
retries *retries*	(Optional) Specifies the number of message retries allowed if a response is not received. Default is 3.
taglist *taglist*	(Optional) Specifies a list of SNMP notify tag values. This tags a location to the target address as a place to send notifications. List must be enclosed in quotes and tag values must be separated by a space (i.e.: **"tag 1 tag 2"**)
volatile | **nonvolatile**	(Optional) Specifies temporary (default), or permanent storage for SNMP entries.

Command Defaults

- If not specified, *udpport* will be set to **162**.
- If not specified, *mask* will be set to **255.255.255.255**
- If not specified, *timeout* will be set to **1500**.
- If not specified, number of *retries* will be set to **3**.
- If **taglist** is not specified, none will be set.
- If not specified, storage type will be **nonvolatile**.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure a trap notification called “TrapSink.” This trap notification will be sent to the workstation 192.168.190.80 (which is target address “tr”). It will use security and authorization criteria contained in a target parameters entry called “v2cExampleParams”. For more information on configuring a basic SNMP trap, refer to Section 4.3.8:

```
Matrix(rw)->set snmp targetaddr tr 192.168.190.80 param v2cExampleParams
  taglist TrapSink
```

4.3.6.3 clear snmp targetaddr

Use this command to delete an SNMP target address entry.

clear snmp targetaddr *targetAddr*

Syntax Description

targetAddr	Specifies the target address entry to delete.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear SNMP target address entry “tr”:

```
Matrix(rw)->clear snmp targetaddr tr
```

4.3.7 Configuring SNMP Notification Parameters

Purpose

To configure SNMP notification parameters and optional filters. Notifications are entities which handle the generation of SNMP v1 and v2 “traps” or SNMP v3 “informs” messages to select management targets. Optional notification filters identify which targets should not receive notifications. For a sample SNMP trap configuration showing how SNMP notification parameters are associated with security and authorization criteria (target parameters) and mapped to a management target address, refer to Section 4.3.8.

Commands

The commands used to configure SNMP notification parameters and filters are listed below and described in the associated section as shown.

- show snmp notify (Section 4.3.7.1)
- set snmp notify (Section 4.3.7.2)
- clear snmp notify (Section 4.3.7.3)
- show snmp notifyfilter (Section 4.3.7.4)
- set snmp notifyfilter (Section 4.3.7.5)
- clear snmp notifyfilter (Section 4.3.7.6)
- show snmp notifyprofile (Section 4.3.7.7)
- set snmp notifyprofile (Section 4.3.7.8)
- clear snmp notifyprofile (Section 4.3.7.9)

4.3.7.1 show snmp notify

Use this command to display the SNMP notify configuration, which determines which management targets will receive SNMP notifications.

show snmp notify [*notify*] [**volatile** | **nonvolatile** | **read-only**]

Syntax Description

notify	(Optional) Displays notify entries for a specific notify name.
volatile | **nonvolatile** | **read-only**	(Optional) Displays notify entries for a specific storage type.

Command Defaults

- If a *notify* name is not specified, all entries will be displayed.
- If **volatile**, **nonvolatile** or **read-only** are not specified, all storage type entries will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the SNMP notify information:

```
Matrix(rw)->show snmp notify

 --- SNMP notifyTable information ---
Notify name     = 1
Notify Tag      = Console
Notify Type     = trap
Storage type    = nonVolatile
Row status      = active

Notify name     = 2
Notify Tag      = TrapSink
Notify Type     = trap
Storage type    = nonVolatile
Row status      = active
```

Table 4-10 shows a detailed explanation of the command output.

Table 4-10 show snmp notify Output Details

Output	What It Displays...
Notify name	A unique identifier used to index the SNMP notify table.
Notify Tag	Name of the entry in the SNMP notify table.
Notify Type	Type of notification: SNMPv1 or v2 **trap** or SNMPv3 **InformRequest** message.
Storage type	Whether access entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

4.3.7.2 set snmp notify

Use this command to set the SNMP notify configuration. This creates an entry in the SNMP notify table, which is used to select management targets who should receive notification messages. This command's **tag** parameter can be used to bind each entry to a target address using the **set snmp targetaddr** command (Section 4.3.6.2).

set snmp notify *notify* **tag** *tag* [**trap** | **inform**] [**volatile** | **nonvolatile**]

Syntax Description

notify	Specifies an SNMP notify name.
tag *tag*	Specifies an SNMP notify tag. This binds the notify name to the SNMP target address table.
trap | **inform**	(Optional) Specifies SNMPv1 or v2 Trap messages (default) or SNMP v3 InformRequest messages.
volatile | **nonvolatile**	(Optional) Specifies temporary (default), or permanent storage for SNMP entries.

Command Defaults

- If not specified, message type will be set to **trap**.
- If not specified, storage type will be set to **nonvolatile**.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set an SNMP notify configuration with a notify name of "hello" and a notify tag of "world". Notifications will be sent as trap messages and storage type will automatically default to permanent:

```
Matrix(rw)->set snmp notify hello tag world trap
```

4.3.7.3 clear snmp notify

Use this command to clear an SNMP notify configuration.

clear snmp notify *notify*

Syntax Description

notify	Specifies an SNMP notify name to clear.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the SNMP notify configuration for “hello”:

```
Matrix(rw)->clear snmp notify hello
```

About SNMP Notify Filters

Profiles indicating which targets should not receive SNMP notification messages are kept in the NotifyFilter table. If this table is empty, meaning that no filtering is associated with any SNMP target, then no filtering will take place. “Traps” or “informs” notifications will be sent to all destinations in the SNMP targetAddrTable that have tags matching those found in the NotifyTable.

When the NotifyFilter table contains profile entries, the SNMP agent will find any filter profile name that corresponds to the target parameter name contained in an outgoing notification message. It will then apply the appropriate subtree-specific filter when generating notification messages.

4.3.7.4 show snmp notifyfilter

Use this command to display SNMP notify filter information, identifying which profiles will not receive SNMP notifications.

show snmp notifyfilter [*profile***] [subtree** *oid-or-mibobject***] [volatile | nonvolatile | read-only**]

Syntax Description

profile	(Optional) Displays a specific notify filter.
subtree *oid-or-mibobject*	(Optional) Displays a notify filter within a specific subtree.
volatile | **nonvolatile** | **read-only**	(Optional) Displays notify filter entries of a specific storage type.

Command Defaults

If no parameters are specified, all notify filter information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP notify filter information. In this case, the notify profile "pilot1" in subtree 1.3.6 will not receive SNMP notification messages:

```
Matrix(rw)->show snmp notifyfilter

--- SNMP notifyFilter information ---
Profile         = pilot1
Subtree         = 1.3.6
Filter type     = included
Storage type    = nonVolatile
Row status      = active
```

4.3.7.5 set snmp notifyfilter

Use this command to create an SNMP notify filter configuration. This identifies which management targets should NOT receive notification messages, which is useful for fine-tuning the amount of SNMP traffic generated.

set snmp notifyfilter *profile* **subtree** *oid-or-mibobject* [**mask** *mask*] [**included** | **excluded**] [**volatile** | **nonvolatile**]

Syntax Description

profile	Specifies an SNMP filter notify name.
subtree *oid-or-mibobject*	Specifies a MIB subtree ID target for the filter.
mask *mask*	(Optional) Applies a subtree mask.
included | **excluded**	(Optional) Specifies that subtree is included or excluded.
volatile | **nonvolatile**	(Optional) Specifies a storage type.

Command Defaults

- If not specified, **mask** is not set.
- If not specified, subtree will be **included**.
- If storage type is not specified, **nonvolatile** (permanent) will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create an SNMP notify filter called “pilot1” with a MIB subtree ID of 1.3.6:

```
Matrix(rw)->set snmp notifyfilter pilot1 subtree 1.3.6
```

4.3.7.6 clear snmp notifyfilter

Use this command to delete an SNMP notify filter configuration.

clear snmp notifyfilter *profile* **subtree** *oid-or-mibobject*

Syntax Description

profile	Specifies an SNMP filter notify name to delete.
subtree *oid-or-mibobject*	Specifies a MIB subtree ID containing the filter to be deleted.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete the SNMP notify filter “pilot1”:

```
Matrix(rw)->clear snmp notifyfilter pilot1 subtree 1.3.6
```

4.3.7.7 show snmp notifyprofile

Use this command to display SNMP notify profile information. This associates target parameters to an SNMP notify filter to determine who should not receive SNMP notifications.

show snmp notifyprofile [*profile*] [**targetparam** *targetparam*] [**volatile** | **nonvolatile** | **read-only**]

Syntax Description

profile	(Optional) Displays a specific notify profile.
targetparam *targetparam*	(Optional) Displays entries for a specific target parameter.
volatile | **nonvolatile** | **read-only**	(Optional) Displays notify filter entries of a specific storage type.

Command Defaults

If no parameters are specified, all notify profile information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP notify information for the profile named “area51”:

```
Matrix(rw)->show snmp notifyprofile area51

 --- SNMP notifyProfile information ---
Notify Profile  = area51
TargetParam     = v3ExampleParams
Storage type    = nonVolatile
Row status      = active
```

4.3.7.8 set snmp notifyprofile

Use this command to create an SNMP notify filter profile configuration. This associates a notification filter, created with the **set snmp notifyfilter** command (Section 4.3.7.5), to a set of SNMP target parameters to determine which management targets should not receive SNMP notifications.

set snmp notifyprofile *profile* **targetparam** *targetparam* [**volatile** | **nonvolatile**]

Syntax Description

profile	Specifies an SNMP filter notify name.
targetparam *targetparam*	Specifies an associated entry in the SNMP Target Params Table.
volatile | **nonvolatile**	(Optional) Specifies a storage type.

Command Defaults

If storage type is not specified, **nonvolatile** (permanent) will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create an SNMP notify profile named area51 and associate a target parameters entry.

```
Matrix(rw)->set snmp notifyprofile area51 targetparam v3ExampleParams
```

4.3.7.9 clear snmp notifyprofile

Use this command to delete an SNMP notify profile configuration.

clear snmp notifyprofile *profile* **targetparam** *targetparam*

Syntax Description

profile	Specifies an SNMP filter notify name to delete.
targetparam *targetparam*	Specifies an associated entry in the snmpTargetParamsTable.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete SNMP notify profile “area51”:

```
Matrix(rw)->clear snmp notifyprofile area51 targetparam v3ExampleParams
```

4.3.8 Creating a Basic SNMP Trap Configuration

Traps are notification messages sent by an SNMPv1 or v2 agent to a network management station, a console, or a terminal to indicate the occurrence of a significant event, such as when a port or device goes up or down, when there are authentication failures, and when power supply errors occur. The following configuration example shows how to use CLI commands to associate SNMP notification parameters with security and authorization criteria (target parameters), and map the parameters to a management target address.

NOTE: This example illustrates how to configure an SNMPv2 trap notification. Creating an SNMPv1 or v3 Trap, or an SNMPv3 Inform notification would require using the same commands with different parameters, where appropriate. Always ensure that v1/v2 communities or v3 users used for generating traps or informs are pre-configured with enough privileges to access corresponding MIBs.

Complete an SNMPv2 trap configuration on a Matrix Series device as follows:

1. Create a community name that will act as an SNMP user password.
2. Create an SNMP target parameters entry to associate security and authorization criteria to the users in the community created in Step 1.
3. Verify if any applicable SNMP notification entries exist, or create a new one. You will use this entry to send SNMP notification messages to the appropriate management targets created in Step 2.
4. Create a target address entry to bind a management IP address to:
   - The notification entry and tag name created in Step 3.
   - The target parameters entry created in Step 2.

Table 4-11 shows the commands used to complete an SNMPv2 trap configuration on a Matrix Series device.

Table 4-11 Basic SNMP Trap Configuration Command Set

To do this...	Use these commands...
Create a community name.	**set snmp community** (Section 4.3.2.8)
Create an SNMP target parameters entry.	**set snmp targetparams** (Section 4.3.5.2)
Verify if any applicable SNMP notification entries exist.	**show snmp notify** (**Section 4.3.7.1**)

Table 4-11 Basic SNMP Trap Configuration Command Set (Continued)

To do this...	Use these commands...
Create a new notification entry.	**set snmp notify** (Section 4.3.7.2)
Create a target address entry.	**set snmp targetaddr** (Section 4.3.6.2)

Example

This example shows how to:

- create an SNMP community called **mgmt**
- configure a trap notification called **TrapSink**
  This trap notification will be sent with the community name **mgmt** to the workstation **192.168.190.80** (which is target address **tr**). It will use security and authorization criteria contained in a target parameters entry called **v2cExampleParams**.

```
Matrix(rw)->set snmp community mgmt
Matrix(rw)->set snmp targetparams v2cExampleParams user mgmt
security-model v2c message-processing v2c
Matrix(rw)->set snmp notify entry1 tag TrapSink
Matrix(rw)->set snmp targetaddr tr 192.168.190.80 param v2cExampleParams
  taglist TrapSink
```

How SNMP Will Use This Configuration

In order to send a trap/notification requested by a MIB code, the SNMP agent requires the equivalent of a trap "door", a "key" to unlock the door, and a "procedure" for crossing the doorstep. To determine if all these elements are in place, the SNMP agent proceeds as follows:

1. Determines if the "keys" for trap "doors" do exist. In the example configuration above, the key that SNMP is looking for is the notification entry created with the **set snmp notify** command which, in this case, is a key labeled **entry1**.
2. Searches for the doors matching such a key. For example, the parameters set for the **entry1** key shows that it opens only the door **TrapSink**.
3. Verifies that the specified door **TrapSink** is, in fact, available. In this case it was built using the **set snmp targetaddr** command. This command also specifies that this door leads to the management station **192.168.190.80**, and the "procedure" (**targetparams**) to cross the doorstep is called **v2ExampleParams**.

4. Verifies that the **v2ExampleParams** description of how to step through the door is, in fact, there. The agent checks **targetparams** entries and determines this description was made with the **set snmp targetparams** command, which tells exactly which SNMP protocol to use and what community name to provide. In this case, the community name is **mgmt**.
5. Verifies that the **mgmt** community name is available. In this case, it has been configured using the **set snmp community** command.
6. Sends the trap notification message.

5

Spanning Tree Configuration

This chapter describes the Spanning Tree Configuration set of commands and how to use them.

5.1 SPANNING TREE CONFIGURATION SUMMARY

5.1.1 Overview: Single, Rapid and Multiple Spanning Tree Protocols

The IEEE 802.1D Spanning Tree Protocol (STP) resolves the problems of physical loops in a network by establishing one primary path between any two devices in a network. Any duplicate paths are barred from use and become standby or blocked paths until the original path fails, at which point they can be brought into service.

RSTP

The IEEE 802.1w Rapid Spanning Protocol (RSTP), an evolution of 802.1D, can achieve much faster convergence than legacy STP in a properly configured network. RSTP significantly reduces the time to reconfigure the network's active topology when physical topology or configuration parameter changes occur. It selects one switch as the root of a Spanning Tree-connected active topology and assigns port roles to individual ports on the switch, depending on whether that port is part of the active topology.

RSTP provides rapid connectivity following the failure of a switch, switch port, or a LAN. A new root port and the designated port on the other side of the bridge transition to forwarding through an explicit handshake between them. By default, user ports are configured to rapidly transition to forwarding in RSTP.

MSTP

The IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) builds upon 802.1D and RSTP by optimizing utilization of redundant links between switches in a network. When redundant links exist between a pair of switches running single STP, one link is forwarding while the others are blocking for all traffic flowing between the two switches. The blocking links are effectively used

only if the forwarding link goes down. MSTP assigns each VLAN present on the network to a particular Spanning Tree instance, allowing each switch port to be in a distinct state for each such instance: blocking for one Spanning Tree while forwarding for another. Thus, traffic associated with one set of VLANs can traverse a particular inter-switch link, while traffic associated with another set of VLANs can be blocked on that link. If VLANs are assigned to Spanning Trees wisely, no inter-switch link will be completely idle, maximizing network utilization.

For details on creating Spanning Tree instances, refer to Section 5.2.1.12.

For details on mapping Spanning Tree instances to VLANs, refer to Section 5.2.1.15.

NOTE: MSTP and RSTP are fully compatible and interoperable with each other and with legacy STP 802.1D.

5.1.2 Spanning Tree Features

The Matrix Series device meets the requirements of the Spanning Tree Protocols by performing the following functions:

- Creating a single Spanning Tree from any arrangement of switching or bridging elements.
- Compensating automatically for the failure, removal, or addition of any device in an active data path.
- Achieving port changes in short time intervals, which establishes a stable active topology quickly with minimal network disturbance.
- Using a minimum amount of communications bandwidth to accomplish the operation of the Spanning Tree Protocol.
- Reconfiguring the active topology in a manner that is transparent to stations transmitting and receiving data packets.
- Managing the topology in a consistent and reproducible manner through the use of Spanning Tree Protocol parameters.

5.1.3 Process Overview: Spanning Tree Configuration

CAUTION: Spanning Tree configuration should be performed only by personnel who are very knowledgeable about Spanning Trees and the configuration of the Spanning Tree Algorithm. Otherwise, the proper operation of the network could be at risk.

Use the following steps as a guide in the Spanning Tree configuration process:

1. Reviewing and setting Spanning Tree bridge (device) parameters (Section 5.2.1)
2. Reviewing and setting Spanning Tree port parameters (Section 5.2.2)

NOTE: The term “bridge” is used as an equivalent to the term “switch” or “device” in this document.

5.2 SPANNING TREE CONFIGURATION COMMAND SET

5.2.1 Reviewing and Setting Spanning Tree Bridge Parameters

Purpose

To display and set Spanning Tree bridge parameters, including device priorities, hello time, maximum wait time, forward delay, path cost, and topology change trap suppression.

Commands

The commands used to review and set Spanning Tree bridge parameters are listed below and described in the associated section as shown.

- show spantree stats (Section 5.2.1.1)
- show spantree version (Section 5.2.1.2)
- set spantree version (Section 5.2.1.3)
- clear spantree version (Section 5.2.1.4)
- show spantree stpmode (Section 5.2.1.6)
- set spantree stpmode (Section 5.2.1.6)
- clear spantree stpmode (Section 5.2.1.7)
- show spantree maxconfigurablestps (Section 5.2.1.8)

- set spantree maxconfigurablestps (Section 5.2.1.9)
- clear spantree maxconfigurablestps (Section 5.2.1.10)
- show spantree mstilist (Section 5.2.1.11)
- set spantree msti (Section 5.2.1.12)
- clear spantree msti (Section 5.2.1.13)
- show spantree mstmap (Section 5.2.1.14)
- set spantree mstmap (Section 5.2.1.15)
- clear spantree mstmap (Section 5.2.1.16)
- show spantree vlanlist (Section 5.2.1.17)
- show spantree mstcfgid (Section 5.2.1.18)
- set spantree mstcfgid (Section 5.2.1.19)
- clear spantree mstcfgid (Section 5.2.1.20)
- show spantree bridgeprioritymode (Section 5.2.1.21)
- set spantree bridgeprioritymode (Section 5.2.1.22)
- clear spantree bridgeprioritymode (Section 5.2.1.23)
- show spantree priority (Section 5.2.1.24)
- set spantree priority (Section 5.2.1.25)
- clear spantree priority (Section 5.2.1.26)
- show spantree bridgehellomode (Section 5.2.1.27)
- set spantree bridgehellomode (Section 5.2.1.28)
- clear spantree bridgehellomode (Section 5.2.1.29)
- show spantree hello (Section 5.2.1.31)
- set spantree hello (Section 5.2.1.31)
- clear spantree hello (Section 5.2.1.32)
- show spantree maxage (Section 5.2.1.33)
- set spantree maxage (Section 5.2.1.34)
- clear spantree maxage (Section 5.2.1.35)

- show spantree fwddelay (Section 5.2.1.36)
- set spantree fwddelay (Section 5.2.1.37)
- clear spantree fwddelay (Section 5.2.1.38)
- show spantree autoedge (Section 5.2.1.39)
- set spantree autoedge (Section 5.2.1.40)
- clear spantree autoedge (Section 5.2.1.41)
- show spantree legacypathcost (Section 5.2.1.42)
- set spantree legacypathcost (Section 5.2.1.43)
- clear spantree legacypathcost (Section 5.2.1.44)
- show spantree tctrapsuppress (Section 5.2.1.45)
- set spantree tctrapsuppress (Section 5.2.1.46)
- clear spantree tctrapsuppress (Section 5.2.1.47)
- show spantree txholdcount (Section 5.2.1.48)
- set spantree txholdcount (Section 5.2.1.49)
- clear spantree txholdcount (Section 5.2.1.50)
- show spantree maxhops (Section 5.2.1.51)
- set spantree maxhops (Section 5.2.1.52)
- clear spantree maxhops (Section 5.2.1.53)
- show spantree spanguard (Section 5.2.1.54)
- set spantree spanguard (Section 5.2.1.55)
- clear spantree spanguard (Section 5.2.1.56)
- show spantree spanguardtimeout (Section 5.2.1.57)
- set spantree spanguardtimeout (Section 5.2.1.58)
- clear spantree spanguardtimeout (Section 5.2.1.59)
- show spantree spanguardlock (Section 5.2.1.60)
- clear / set spantree spanguardlock (Section 5.2.1.61)
- show spantree spanguardtrapenable (Section 5.2.1.62)

- set spantree spanguardtrapenable (Section 5.2.1.63)
- clear spantree spanguardtrapenable (Section 5.2.1.64)
- show spantree backuproot (Section 5.2.1.65)
- set spantree backuproot (Section 5.2.1.66)
- clear spantree backuproot (Section 5.2.1.67)
- show spantree backuproottrapendable (Section 5.2.1.68)
- set spantree backuproottrapenable (Section 5.2.1.69)
- clear spantree backuproottrapenable (Section 5.2.1.70)
- show spantree newroottrapendable (Section 5.2.1.71)
- set spantree newroottrapenable (Section 5.2.1.72)
- clear spantree newroottrapenable (Section 5.2.1.73)
- clear spantree default (Section 5.2.1.74)
- show spantree debug (Section 5.2.1.75)
- clear spantree debug (Section 5.2.1.76)

5.2.1.1 show spantree stats

Use this command to display Spanning Tree information for one or more ports.

show spantree stats [**port** *port-string*] [**sid** *sid*] [**active**]

Syntax Description

port *port-string*	(Optional) Displays information for the specified port(s). For a detailed description of possible *port--string* values, refer to Section 3.1.1.
sid *sid*	(Optional) Displays information for a specific Spanning Tree identifier. If not specified, SID 0 is assumed.
active	(Optional) Displays information for ports that have received STP BPDUs since boot.

Command Defaults

- If *port-string* is not specified, Spanning Tree information for all ports will be displayed.
- If *sid* is not specified, information for Spanning Tree 0 will be displayed.
- If **active** is not specified information for all ports will be displayed regardless of whether or not they have received BPDUs.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the device's Spanning Tree configuration:

```
Matrix(rw)->show spantree stats

Spanning tree status          - enabled
Spanning tree instance        - 0
Designated Root MacAddr       - 00-e0-63-9d-c1-c8
Designated Root Priority      - 0
Designated Root Cost          - 10000
Designated Root Port          - lag.0.1
Root Max Age                  - 20 sec
Root Hello Time               - 2  sec
Root Forward Delay            - 15 sec
Bridge ID MAC Address         - 00-01-f4-da-5e-3d
Bridge ID Priority            - 32768
Bridge Max Age                - 20 sec
Bridge Hello Time             - 2  sec
Bridge Forward Delay          - 15 sec
Topology Change Count         - 7
Time Since Top Change         - 00 days 03:19:15
Max Hops                      - 20
```

Table 5-1 shows a detailed explanation of command output.

Table 5-1 show spantree Output Details

Output	What It Displays...
Spanning tree instance	Spanning Tree ID.
Spanning tree status	Whether Spanning Tree is enabled or disabled.
Designated Root MacAddr	MAC address of the designated Spanning Tree root bridge.
Designated Root Port	Port through which the root bridge can be reached.
Designated Root Priority	Priority of the designated root bridge.
Designated Root Cost	Total path cost to reach the root.
Root Max Age	Amount of time (in seconds) a BPDU packet should be considered valid.
Root Hello Time	Interval (in seconds) at which the root device sends BPDU (Bridge Protocol Data Unit) packets.

Table 5-1 show spantree Output Details (Continued)

Output	What It Displays...
Root Forward Delay	Amount of time (in seconds) the root device spends in listening or learning mode.
Bridge ID MAC Address	Unique bridge MAC address, recognized by all bridges in the network.
Bridge ID Priority	Bridge priority, which is a default value, or is assigned using the **set spantree priority** command. For details, refer to Section 5.2.1.25.
Bridge Max Age	Maximum time (in seconds) the bridge can wait without receiving a configuration message (bridge "hello") before attempting to reconfigure. This is a default value, or is assigned using the **set spantree maxage** command. For details, refer to Section 5.2.1.34.
Bridge Hello Time	Amount of time (in seconds) the bridge sends BPDUs. This is a default value, or is assigned using the **set spantree hello** command. For details, refer to Section 5.2.1.31.
Bridge Forward Delay	Amount of time (in seconds) the bridge spends in listening or learning mode. This is a default value, or is assigned using the **set spantree fwddelay** command. For details, refer to Section 5.2.1.37.
Topology Change Count	Number of times topology has changed on the bridge.
Time Since Top Change	Amount of time (in days, hours, minutes and seconds) since the last topology change.
Max Hops	Maximum number of hops information for a particular Spanning Tree instance may traverse (via relay of BPDUs within the applicable MST region) before being discarded. This is a default value, or is assigned using the **set spantree mashops** command. For details, refer to Section 5.2.1.52.

5.2.1.2 show spantree version

Use this command to display the current version of the Spanning Tree protocol running on the device.

show spantree version

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display Spanning Tree version information for the device:

```
Matrix(rw)->show spantree version
Force Version is mstp
```

5.2.1.3 set spantree version

Use this command to set the version of the Spanning Tree protocol to MSTP (Multiple Spanning Tree Protocol), RSTP (Rapid Spanning Tree Protocol) or to STP 802.1D-compatible.

set spantree version {**mstp** | **stpcompatible** | **rstp**}

NOTE: In most networks, Spanning Tree version should not be changed from its default setting of **mstp** (Multiple Spanning Tree Protocol) mode. MSTP mode is fully compatible and interoperable with legacy STP 802.1D and Rapid Spanning Tree (RSTP) bridges. Setting the version to **stpcompatible** mode will cause the bridge to transmit only 802.1D BPDUs, and will prevent non-edge ports from rapidly transitioning to forwarding state.

Syntax Description

mstp	Sets the version to STP 802.1s-compatible.
stpcompatible	Sets the version to STP 802.1D-compatible.
rstp	Sets the version to 802.1w-compatible.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to globally change the Spanning Tree version from the default of MSTP to RSTP:

```
Matrix(rw)->set spantree version rstp
```

5.2.1.4 clear spantree version

Use this command to reset the Spanning Tree version to MSTP mode.

clear spantree version

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the Spanning Tree version:

```
Matrix(rw)->clear spantree version
```

5.2.1.5 show spantree stpmode

Use this command to display the Spanning Tree Protocol (STP) mode setting.

show spantree stpmode

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the STP mode:

```
Matrix(rw)->show spantree stpmode
Bridge Stp Mode is set to ieee8021
```

5.2.1.6 set spantree stpmode

Use this command to globally enable or disable the Spanning Tree Protocol (STP) mode.

set spantree stpmode {**none | ieee8021**}

Syntax Description

none	Disables Spanning Tree.
ieee8021	Enables 802.1 Spanning Tree mode.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable Spanning Tree:

```
Matrix(rw)->set spantree stpmode none
```

5.2.1.7 clear spantree stpmode

Use this command to reset the Spanning Tree protocol mode to the default setting of IEEE802.1. This re-enables Spanning Tree.

clear spantree stpmode

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the STP mode to IEEE 802.1:

```
Matrix(rw)->clear spantree stpmode
```

5.2.1.8 show spantree maxconfigurablestps

Use this command to display the setting for the maximum number of user configurable Spanning Tree instances.

show spantree maxconfigurablestps

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the STP maximum configs setting.

```
Matrix(rw)->show spantree maxconfigurablestps
Max user configurable stps is set to 33
```

5.2.1.9 set spantree maxconfigurablestps

Use this command to set the maximum number of user configurable Spanning Tree instances.

set spantree maxconfigurablestps *numstps*

Syntax Description

numstps	• Specifies the maximum number of user configured STPs to be allowed on this bridge. Valid values are 1 - 9.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the STP max configs to 8

```
Matrix(rw)->set spantree maxconfigurablestps 8
```

5.2.1.10 clear spantree maxconfigurablestps

Use this command to clear the setting for the maximum number of user configurable Spanning Tree instances.

clear spantree maxconfigurablestps

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the STP max configs setting

```
Matrix(rw)->clearspantree maxconfigurablestps
```

5.2.1.11 show spantree mstilist

Use this command to display a list of Multiple Spanning Tree (MST) instances configured on the device.

show spantree mstilist

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display a list of MST instances. In this case, SID 2 has been configured:

```
Matrix(rw)->show spantree mstilist
 Configured Multiple Spanning Tree instances:
  2
```

5.2.1.12 set spantree msti

Use this command to create or delete a Multiple Spanning Tree instance.

set spantree msti sid *sid* {**create** | **delete**}

Syntax Description

sid *sid*	Sets the Multiple Spanning Tree ID. Valid values are **1** - **4094**. **NOTE:** Matrix Series devices will support up to 9 MST instances.
create | **delete**	Creates or deletes an MST instance.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create MST instance 2:

```
Matrix(rw)->set spantree msti sid 2 create
```

5.2.1.13 clear spantree msti

Use this command to delete one or more Multiple Spanning Tree instances.

clear spantree msti *sid*

Syntax Description

sid	Specifies a multiple Spanning Tree ID to be deleted.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete MST instance 1:

```
Matrix(rw)->clear spantree msti 1
```

5.2.1.14 show spantree mstmap

Use this command to display the mapping of a filtering database ID (FID) to a Spanning Trees. Since VLANs are mapped to FIDs, this shows to which SID a VLAN is mapped.

show spantree mstmap [**fid** *fid*]

Syntax Description

fid *fid*	(Optional) Displays information for specific FIDs.

Command Defaults

If *fid* is not specified, information for all assigned FIDs will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SID to FID mapping information for FID 1. In this case, no new mappings have been configured:

```
Matrix(rw)->show spantree mstmap fid 1
FID:       SID:
1          0
```

5.2.1.15 set spantree mstmap

Use this command to map one or more filtering database IDs (FIDs) to a SID. Since VLANs are mapped to FIDs, this essentially maps one or more VLAN IDs to a Spanning Tree (SID).

set spantree mstmap *fid* [**sid** *sid*]

Syntax Description

fid	Specifies one or more FIDs to assign to the MST. Valid values are **1 - 4093**, and must correspond to a VLAN ID created using the **set vlan** command as described in Section 6.3.2.1.
sid *sid*	(Optional) Specifies a Multiple Spanning Tree ID. Valid values are **1 - 4094**, and must correspond to a SID created using the **set msti** command as described in Section 5.2.1.12.

Command Defaults

If *sid* is not specified, FID(s) will be mapped to Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to map FID 3 to SID 2:

```
Matrix(rw)->set spantree mstmap 3 sid 2
```

5.2.1.16 clear spantree mstmap

Use this command to map a FID back to SID 0.

clear spantree mstmap *fid*

Syntax Description

fid	Specifies one or more FIDs to reset to 0.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to map FID 2 back to SID 0:

```
Matrix(rw)->clear spantree mstmap 2
```

5.2.1.17 show spantree vlanlist

Use this command to display the VLAN ID(s) assigned to one or more Spanning Trees.

show spantree vlanlist [*vlan-list*]

Syntax Description

vlan-list	(Optional) Displays information for specific VLAN(s).

Command Defaults

If not specified, SID assignment will be displayed only for VLANs assigned to any SID other than SID 0.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display assignments for all VLANs assigned to any SID other than SID 0:

```
Matrix(rw)->show spantree vlanlist
Vlan 104 is mapped to Sid 104
Vlan 105 is mapped to Sid 105
Vlan 106 is mapped to Sid 106
Vlan 107 is mapped to Sid 107
```

5.2.1.18 show spantree mstcfgid

Use this command to display the MST configuration identifier elements, including format selector, configuration name, revision level, and configuration digest.

show spantree mstcfgid

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the MST configuration identifier elements. In this case, the default revision level of 0, and the default configuration name (a string representing the bridge MAC address) have not been changed. For information on using the **set spantree mstcfgid** command to change these settings, refer to Section 5.2.1.19:

```
Matrix(rw)->show spantree mstcfgid
 MST Configuration Identifier:
  Format Selector: 0
  Configuration Name: 00:01:f4:89:51:94
  Revision Level: 0
  Configuration Digest: ac:36:17:7f:50:28:3c:d4:b8:38:21:d8:ab:26:de:62
```

5.2.1.19 set spantree mstcfgid

Use this command to set the MST configuration name and/or revision level.

set spantree mstcfgid {**cfgname** *name* | **rev** *level*}

Syntax Description

cfgname *name*	Specifies an MST configuration name.
rev *level*	Specifies an MST revision level. Valid values are **0 - 65535**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the MST configuration name to “mstconfig”:

```
Matrix(rw)->set spantree mstconfigid cfgname mstconfig
```

5.2.1.20 clear spantree mstcfgid

Use this command to reset the MST revision level to a default value of 0, and the configuration name to a default string representing the bridge MAC address.

clear spantree mstcfgid

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the MST configuration identifier elements to default values:

```
Matrix(rw)->clear spantree mstcfgid
```

5.2.1.21 show spantree bridgeprioritymode

Use this command to display the Spanning Tree bridge priority mode setting.

show spantree bridgeprioritymode

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the Spanning Tree bridge priority mode setting:

```
Matrix(rw)->show spantree bridgeprioritymode
Bridge Priority Mode is set to IEEE802.1t mode.
```

5.2.1.22 set spantree bridgeprioritymode

Use this command to set the Spanning Tree bridge priority mode to 802.1D (legacy) or 802.1t. This will affect the range of priority values used to determine which device is selected as the Spanning Tree root as described in **set spantree priority** (Section 5.2.1.25).

set spantree bridgeprioritymode {**8021d** | **8021t**}

Syntax Description

8021d	Sets the bridge priority mode to use 802.1D (legacy) values of values, which are 0 - 65535.
8021t	Sets the bridge priority mode to use 802.1t values, which are 0 - 61440, in increments of 4096. Values will be rounded up or down, depending on the 802.1t value to which the entered value is closest.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the bridge priority mode to 802.1D:

```
Matrix(rw)->set spantree bridgeprioritymode 8021d
```

5.2.1.23 clear spantree bridgeprioritymode

Use this command to reset the Spanning Tree bridge priority mode to the default setting of 802.1t.

clear spantree bridgeprioritymode

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the bridge priority mode to 802.1t:

```
Matrix(rw)->clear spantree bridgeprioritymode
```

5.2.1.24 show spantree priority

Use this command to display the Spanning Tree bridge priority.

show spantree priority [*sid*]

Syntax Description

sid	(Optional) Displays the priority for a specific Spanning Tree. Valid values are **0 - 4094**. If not specified, SID 0 is assumed.

Command Defaults

If *sid* is not specified, priority will be shown for Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to show the bridge priority for Spanning Tree 0

```
Matrix(rw)->show spantree priority
Bridge Priority is set to 4096 on sid 0
```

5.2.1.25 set spantree priority

Use this command to set the device's Spanning Tree priority. The device with the highest priority (lowest numerical value) becomes the Spanning Tree root device. If all devices have the same priority, the device with the lowest MAC address will then become the root device. Depending on the **set bridgepriority mode** setting as described in Section 5.2.1.22, some priority values may be translated, and the translation will display in the CLI output as shown in the examples in this section.

set spantree priority *priority* [*sid*]

Syntax Description

priority	Specifies the priority of the bridge. Valid values are from **0** to **65535,** with the numerical value of 0 indicating highest priority and the numerical value 65535 indicating lowest priority. When 802.1t is selected as the bridge priority mode, as described in Section 5.2.1.22, values will be rounded up or down, depending on the 802.1t value to which the entered value is closest, in increments of 4096.
sid	(Optional) Sets the priority on a specific Spanning Tree. Valid values are **0 - 4094**. If not specified, SID 0 is assumed.

Command Defaults

If *sid* is not specified, priority will be set on Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set the bridge priority to 1 on all SIDs with 8021t priority mode enabled:

```
Matrix(rw)->set spantree priority 1
Bride Priority has been translated to incremental step of 4096
```

This example shows how to set the bridge priority to 15 on all SIDs with 8021t priority mode enabled:

```
Matrix(rw)->set spantree priority 15
Bride Priority has been translated to incremental step of 61440
```

This example shows how to set the bridge priority to 4000 on all SIDs with 8021t priority mode enabled:

```
Matrix(rw)->set spantree priority 4000
Bride Priority has been rounded up to 4096 from 4000
```

This example shows how to set the bridge priority to 10000 on all SIDs with 8021t priority mode enabled:

```
Matrix(rw)->set spantree priority 10000
Bride Priority has been rounded down to 8192 from 10000
```

This example shows how to set the bridge priority to 1000 on all SIDs with 8021t priority mode enabled:

```
Matrix(rw)->set spantree priority 1000
Bride Priority has been rounded down to 0 from 1000
```

5.2.1.26 clear spantree priority

Use this command to reset the Spanning Tree priority to the default value of 32768.

clear spantree priority [*sid*]

Syntax Description

sid	(Optional) Resets the priority on a specific Spanning Tree. Valid values are **0 - 4094**. If not specified, SID 0 is assumed.

Command Defaults

If *sid* is not specified, priority will be reset on Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the bridge priority on SID 1:

```
Matrix(rw)->clear spantree priority 1
```

5.2.1.27 show spantree bridgehellomode

Use this command to display the status of bridge hello mode on the device. When enabled, a single bridge administrative hello time is being used. When disabled, per-port administrative hello times are being used.

show spantree bridgehellomode

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the Spanning Tree bridge hello mode. In this case, a single bridge hello mode has been enabled using the **set spantree bridgehellomode** command as described in Section 5.2.1.31:

```
Matrix(rw)->show spantree bridgehellomode
 Bridge Hello Mode is currently enabled.
```

5.2.1.28 set spantree bridgehellomode

Use this command to enable or disable bridge hello mode on the device.

set spantree bridgehellomode {**enable** | **disable**}

Syntax Description

enable	Enables single Spanning Tree bridge hello mode.
disable	Disables single Spanning Tree bridge hello mode, allowing for the configuration of per-port hello times.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable single Spanning Tree hello mode on the device. Per-port hello times can now be configured using the **set spantree porthellomode** command as described in Section 5.2.2.13:

```
Matrix(rw)->set spantree bridgehellomode disable
```

5.2.1.29 clear spantree bridgehellomode

Use this command to reset the Spanning Tree administrative hello mode to enabled.

clear spantree bridgehellomode

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the Spanning Tree bridge hello mode to enabled:

```
Matrix(rw)->clear spantree bridgehellomode
```

5.2.1.30 show spantree hello

Use this command to display the Spanning Tree hello time.

show spantree hello

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the Spanning Tree hello time:

```
Matrix(rw)->show spantree hello
 Bridge Hello Time is set to 2 seconds
```

5.2.1.31 set spantree hello

Use this command to set the device's Spanning Tree hello time, This is the time interval (in seconds) the device will transmit BPDUs indicating it is active.

set spantree hello *interval*

Syntax Description

interval	Specifies the number of seconds the system waits before broadcasting a bridge hello message (a multicast message indicating that the system is active). Valid values are **1** - **10**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to globally set the Spanning Tree hello time to 10 seconds:

```
Matrix(rw)->set spantree hello 10
```

5.2.1.32 clear spantree hello

Use this command to reset the Spanning Tree hello time to the default value of 2 seconds.

clear spantree hello

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to globally reset the Spanning Tree hello time:

```
Matrix(rw)->clear spantree hello
```

5.2.1.33 show spantree maxage

Use this command to display the Spanning Tree maximum aging time.

show spantree maxage

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the Spanning Tree maximum aging time:

```
Matrix(rw)->show spantree maxage
 Bridge Max Age Time is set to 20 seconds
```

5.2.1.34 set spantree maxage

Use this command to set the bridge maximum aging time. This is the maximum time (in seconds) a device can wait without receiving a configuration message (bridge "hello") before attempting to reconfigure. All device ports (except for designated ports) should receive configuration messages at regular intervals. Any port that ages out STP information provided in the last configuration message becomes the designated port for the attached LAN. If it is a root port, a new root port is selected from among the device ports attached to the network.

set spantree maxage *agingtime*

Syntax Description

agingtime	Specifies the maximum number of seconds that the system retains the information received from other bridges through STP. Valid values are **6 - 40**.

Command Defaults

None

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the maximum aging time to 25 seconds:

```
Matrix(rw)->set spantree maxage 25
```

5.2.1.35 clear spantree maxage

Use this command to reset the maximum aging time for a Spanning Tree to the default value of 20 seconds.

clear spantree maxage

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to globally reset the maximum aging time:

```
Matrix(rw)->clear spantree maxage
```

5.2.1.36 show spantree fwddelay

Use this command to display the Spanning Tree forward delay time.

show spantree fwddelay

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the Spanning Tree forward delay time:

```
Matrix(rw)->show spantree fwddelay
 Bridge Forward Delay is set to 15 seconds
```

5.2.1.37 set spantree fwddelay

Use this command to set the Spanning Tree forward delay. This is the maximum time (in seconds) the root device will wait before changing states (i.e., listening to learning to forwarding). This delay is required because every device must receive information about topology changes before it starts to forward frames. In addition, each port needs time to listen for conflicting information that would make it return to a blocking state; otherwise, temporary data loops might result.

set spantree fwddelay *delay*

Syntax Description

delay	Specifies the number of seconds for the bridge forward delay. Valid values are **4 - 30**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to globally set the bridge forward delay to 16 seconds:

```
Matrix(rw)->set spantree fwddelay 16
```

5.2.1.38 clear spantree fwddelay

Use this command to reset the Spanning Tree forward delay to the default setting of 15 seconds.

clear spantree fwddelay

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to globally reset the bridge forward delay:

```
Matrix(rw)->clear spantree fwddelay
```

5.2.1.39 show spantree autoedge

Use this command to display the status of automatic edge port detection.

show spantree autoedge

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the status of the automatic edge port detection function:

```
Matrix(rw)->show spantree autoedge
 autoEdge is currently enabled.
```

5.2.1.40 set spantree autoedge

Use this command to enable or disable the automatic edge port detection function.

set spantree autoedge {**disable** | **enable**}

Syntax Description

disable | **enable**	Disables or enables automatic edge port detection.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable automatic edge port detection:

```
Matrix(rw)->set spantree autoedge disable
```

5.2.1.41 clear spantree autoedge

Use this command to reset automatic edge port detection to the default state of enabled.

clear spantree autoedge

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset automatic edge port detection to enabled:

```
Matrix(rw)->clear spantree autoedge
```

5.2.1.42 show spantree legacypathcost

Use this command to display the default Spanning Tree path cost setting.

show spantree legacypathcost

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the default Spanning Tree path cost setting:

```
Matrix(rw)->show spantree legacypathcost
Legacy Path Cost is disabled
```

5.2.1.43 set spantree legacypathcost

Use this command to enable or disable legacy (802.1D) path cost values.

set spantree legacypathcost {**disable** | **enable**}

NOTE: By default, legacy path cost is disabled. Enabling the device to calculate legacy path costs affects the range of valid values that can be entered in the **set spantree adminpathcost** command (Section 5.2.2.17).

Syntax Description

disable | **enable**	Enables or disables legacy (802.1D) path cost values.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the default path cost values to 802.1D:

```
Matrix(rw)->set spantree legacypathcost enable
```

5.2.1.44 clear spantree legacypathcost

Use this command to set the Spanning Tree default value for legacy path cost to 802.1t values.

clear spantree legacypathcost

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the default path cost values to 802.1t:

```
Matrix(rw)->clear spantree legacypathcost
```

5.2.1.45 show spantree tctrapsuppress

Use this command to display the status of topology change trap suppression on Rapid Spanning Tree edge ports.

show spantree tctrapsuppress

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the status of topology change trap suppression:

```
Matrix(rw)->show spantree tctrapsuppress
Topology change trap suppression is currently enabled.
```

5.2.1.46 set spantree tctrapsuppress

Use this command to disable or enable topology change trap suppression on Rapid Spanning Tree edge ports. By default, RSTP non-edge (bridge) ports that transition to forwarding or blocking cause the switch to issue a topology change trap. When topology change trap suppression is enabled, which is the device default, edge ports (such as end station PCs) are prevented from sending topology change traps. This is because there is usually no need for network management to monitor edge port STP transition states, such as when PCs are powered on. When topology change trap suppression is disabled, all ports, including edge and bridge ports, will transmit topology change traps.

set spantree tctrapsupress {**disable** | **enable** | **edgedisable**}

Syntax Description

disable | **enable**	Disables or enables topology change trap suppression.
edgedisable	Disables sending topology change traps on edge ports.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to allow Rapid Spanning Tree edge ports to transmit topology change traps:

```
Matrix(rw)->set spantree tctrapsuppress disable
```

5.2.1.47 clear spantree tctrapsuppress

Use this command to clear topology change trap suppression settings.

clear spantree tctrapsuppress

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear topology change trap suppression settings:

```
Matrix(rw)->clear spantree tctrapsuppress
```

5.2.1.48 show spantree txholdcount

Use this command to display the maximum BPDU transmission rate.

show spantree txholdcount

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the transmit hold count setting:

```
Matrix(rw)->show spantree txholdcount
Tx hold count = 3.
```

5.2.1.49 set spantree txholdcount

Use this command to set the maximum BPDU transmission rate. This is the number of BPDUs which will be transmitted before transmissions are subject to a one-second timer.

set spantree txholdcount *txholdcount*

Syntax Description

txholdcount	Specifies the maximum number of BPDUs to be transmitted before transmissions are subject to a one-second timer. Valid values are **1** - **10**. Default value is **6**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to globally set the transmit hold count to 5:

```
Matrix(rw)->set spantree txholdcount 5
```

5.2.1.50 clear spantree txholdcount

Use this command to reset the transmit hold count to the default value of 6.

clear spantree txholdcount

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the transmit hold count:

```
Matrix(rw)->clear spantree txholdcount
```

5.2.1.51 show spantree maxhops

Use this command to display the Spanning Tree maximum hop count.

show spantree maxhops

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the Spanning Tree maximum hop count:

```
Matrix(rw)->show spantree maxhops
Bridge Max Hop count is set to 20
```

5.2.1.52 set spantree maxhops

Use this command to set the Spanning Tree maximum hop count. This is the maximum number of hops that the information for a particular Spanning Tree instance may traverse (via relay of BPDUs within the applicable MST region) before being discarded.

set spantree maxhops *max_hop_count*

Syntax Description

max_hop_count	Specifies the maximum number of hops allowed. Valid values are **0** to **255**. Default value is **20**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the maximum hop count to 40:

```
Matrix(rw)->set spantree maxhops 40
```

5.2.1.53 clear spantree maxhops

Use this command to reset the maximum hop count to the default value of 20.

clear spantree maxhops

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the maximum hop count to 20:

```
Matrix(rw)->clear spantree maxhops
```

5.2.1.54 show spantree spanguard

Use this command to display the status of the Spanning Tree span guard function.

show spantree spanguard

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the span guard function status:

```
Matrix(rw)->show spantree spanguard
 spanguard is currently disabled.
```

5.2.1.55 set spantree spanguard

Use this command to enable or disable the Spanning Tree span guard function. When enabled, this prevents an unauthorized bridge from becoming part of the active Spanning Tree topology. It does this by disabling a port that receives a BPDU when that port has been defined as an edge (user) port (as described in Section 5.2.2.20). This port will remain disabled until the amount of time defined by the **set spantree spanguardtimeout** (Section 5.2.1.58) has passed since the last seen BPDU or the port is manually unlocked (as described in Section 5.2.1.61).

set spantree spanguard {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables the span guard function.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the span guard function:

```
Matrix(rw)->set spantree spanguard enable
```

5.2.1.56 clear spantree spanguard

Use this command to resets the status of the Spanning Tree span guard function to disabled.

clear spantree spanguard

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the status of the span guard function to disabled:

```
Matrix(rw)->clear spantree spanguard
```

5.2.1.57 show spantree spanguardtimeout

Use this command to display the Spanning Tree span guard timeout setting.

show spantree spanguardtimeout

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the span guard timeout setting:

```
Matrix(rw)->show spantree spanguardtimeout
 spanguard timeout is set at 300 seconds.
```

5.2.1.58 set spantree spanguardtimeout

Use this command to set the amount of time (in seconds) an edge port will remain locked by the span guard function.

set spantree spanguardtimeout *timeout*

Syntax Description

timeout	Specifies a timeout value in seconds. Valid values are **0** (forever) to **65535**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the span guard timeout to 600 seconds:

```
Matrix(rw)->set spantree spanguardtimeout 600
```

5.2.1.59 clear spantree spanguardtimeout

Use this command to reset the Spanning Tree span guard timeout to the default value of 300 seconds.

clear spantree spanguardtimeout

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the span guard timeout to 300 seconds:

```
Matrix(rw)->clear spantree spanguardtimeout
```

5.2.1.60 show spantree spanguardlock

Use this command to display the span guard lock status of one or more ports.

show spantree spanguardlock *port-string*

Syntax Description

port-string	Specifies the port(s) for which to show span guard lock status. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the span guard lock status for ge.2.1:

```
Matrix(rw)->show spantree spanguardlock ge.2.1
 spanguard status for port ge.2.1 is UNLOCKED.
```

5.2.1.61 clear / set spantree spanguardlock

Use either of these commands to unlock one or more ports locked by the Spanning Tree span guard function. When span guard is enabled, it locks ports that receive BPDUs when those ports have been defined as edge (user) ports (as described in Section 5.2.2.20).

clear spantree spanguardlock *port-string*

set spantree spanguardlock *port-string*

Syntax Description

port-string	Specifies port(s) to unlock. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to unlock port fe.1.16:

```
Matrix(rw)->clear spantree spanguardlock fe.1.16
```

5.2.1.62 show spantree spanguardtrapenable

Use this command to displays the state of the Spanning Tree span guard trap function.

show spantree spanguardtrapenable

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the state of the span guard trap function:

```
Matrix(rw)->show spantree spanguardtrapenable
 Span Guard Trap is set to enable
```

5.2.1.63 set spantree spanguardtrapenable

Use this command to enable or disable the sending of an SNMP trap message when span guard detects that an unauthorized port has tried to join the Spanning Tree.

set spantree spanguardtrapenable {**disable** | **enable**}

Syntax Description

disable | **enable**	Disables or enables the span guard trap function.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable the span guard trap function:

```
Matrix(rw)->set spantree spanguardtrapenable disable
```

5.2.1.64 clear spantree spanguardtrap enable

Use this command to reset the Spanning Tree span guard trap function back to the default state of enabled.

clear spantree spanguardtrapenable

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the span guard trap function to enabled:

```
Matrix(rw)->clear spantree spanguardtrapenable
```

5.2.1.65 show spantree backuproot

Use this command to display the state of the Spanning Tree backup root function.

show spantree backuproot [*sid*]

Syntax Description

sid	(Optional) Displays status for a specific Spanning Tree. Valid values are **0 - 4094**. If not specified, SID 0 is assumed.

Command Defaults

If sid is not specified, status will be shown for Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the status of the backup root function on SID 0:

```
Matrix(rw)->show spantree backuproot
Backup Root is set to disable on sid 0
```

5.2.1.66 set spantree backuproot

Use this command to enable or disable the Spanning Tree backup root function. Enabled by default on bridge(s) directly connected to the root bridge, this prevents stale Spanning Tree information from circulating in the event the root bridge is lost. If this happens, the backup root will dynamically lower its bridge priority so that it will be selected as the new root over the lost root bridge.

set spantree backuproot *sid* {**enable** | **disable**}

Syntax Description

sid	Specifies the Spanning Tree on which to enable or disable the backup root function. Valid values are **0** - **4094**.
enable | **disable**	Enables or disables the backup root function.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the backup root function on SID 2:

```
Matrix(rw)->set spantree backuproot 2 enable
```

5.2.1.67 clear spantree backuproot

Use this command to reset the Spanning Tree backup root function to the default state of disabled.

clear spantree backuproot *sid*

Syntax Description

sid	Specifies the Spanning Tree on which to reset the backup root function. Valid values are **0 - 4094**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the backup root function to disabled on SID 2:

```
Matrix(rw)->clear spantree backuproot 2
```

5.2.1.68 show spantree backuproottrapendable

Use this command to display the state of the Spanning Tree backup root trap function.

show spantree backuproottrapenable

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the status of the backup root trap function:

```
Matrix(rw)->show spantree backuproottrapenable
Backup Root Trap is set to enable
```

5.2.1.69 set spantree backuproottrapenable

Use this command to enable or disable the Spanning Tree backup root trap function. When SNMP trap messageing is configured, this sends a trap message when the back up root function makes a Spanning Tree the new root of the network.

set spantree backuproottrapenable {**enable** | **disable**}

Syntax Description

enable | disable	Enables or disables the backup root trap function.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the backup root trap function:

```
Matrix(rw)->set spantree backuproottrapenable enable
```

5.2.1.70 clear spantree backuproottrapenable

Use this command to resets the Spanning Tree backup root trap function to the default state of disabled.

clear spantree backuproottrapenable.

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the backup root trap function:

```
Matrix(rw)->clear spantree backuproottrapenable
```

5.2.1.71 show spantree newroottrapendable

Use this command to display the state of the Spanning Tree new root trap function.

show spantree newroottrapenable

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the status of the new root trap function:

```
Matrix(rw)->show spantree newroottrapenable
New Root Trap is set to enable
```

5.2.1.72 set spantree newroottrapenable

Use this command to enable or disable the Spanning Tree new root trap function. When SNMP trap messaging is configured, this sends a trap message when a Spanning Tree becomes the new root of the network.

set spantree newroottrapenable {**enable** | **disable**}

Syntax Description

enable | disable	Enables or disables the backup root trap function.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the new root trap function:

```
Matrix(rw)->set spantree newroottrapenable enable
```

5.2.1.73 clear spantree newroottrapenable

Use this command to reset the Spanning Tree new root trap function back to the default state of enabled.

clear spantree newroottrapenable

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the new root trap function to enabled:

```
Matrix(rw)->clear spantree newroottrapenable
```

5.2.1.74 clear spantree default

Use this command to restore default values to a Spanning Tree.

clear spantree default [*sid*]

Syntax Description

sid	(Optional) Restores defaults on a specific Spanning Tree. Valid values are **0 - 4094**. If not specified, SID 0 is assumed.

Command Defaults

If *sid* is not specified, defaults will be restored on Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to restore Spanning Tree defaults on SID 1:

```
Matrix(rw)->clear spantree default 1
```

5.2.1.75 show spantree debug

Use this command to display Spanning Tree debug counters for one or more ports.

show spantree debug [**port** *port-string*] [**sid** *sid*] [**active**]

Syntax Description

port *port-string*	(Optional) Displays debug counters for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
sid *sid*	(Optional) Displays the debug counters for a specific Spanning Tree identifier. Valid values are **0 - 4094**. If not specified, SID 0 is assumed.
active	(Optional) Displays only the debug counters for ports that have received at least one configuration or RSTP BPDU.

Command Defaults

- If *port-string* is not specified, no port information will be displayed.
- If *sid* is not specified, debug counters will be displayed for Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display Spanning Tree debug counters for link aggregation port 3, SID 0:

```
Matrix(rw)->show spantree debug port lag.0.3

STP Diagnostic Common Counters for SID 0
----------------------------------------
Topology Change Count        - 379
Message Expiration Count     - 16
Invalid BPDU Count           - 0
STP BPDU Rx Count            - 3
STP BPDU Tx Count            - 3
STP TCN BPDU Rx Count        - 335
STP TCN BPDU Tx Count        - 0
STP TC BPDU Rx Count         - 0
STP TC BPDU Tx Count         - 0
RST BPDU Rx Count            - 81812
RST BPDU Tx Count            - 790319
RST TC BPDU Rx Count         - 2131
RST TC BPDU Tx Count         - 26623
MST BPDU Rx Count            - 0
MST BPDU Tx Count            - 0
MST CIST TC BPDU Rx Count    - 0
MST CIST TC BPDU Tx Count    - 0

STP Diagnostic Port Counters for Interface Number lag.0.3
---------------------------------------------------------
Port Role                    - RootPort
Message Expiration Count     - 4
Invalid BPDU Count           - 0
STP BPDU Rx Count            - 0
STP BPDU Tx Count            - 0
STP TCN BPDU Rx Count        - 0
STP TCN BPDU Tx Count        - 0
STP TC BPDU Rx Count         - 0
STP TC BPDU Tx Count         - 0
RST BPDU Rx Count            - 50263
RST BPDU Tx Count            - 47602
RST TC BPDU Rx Count         - 497
RST TC BPDU Tx Count         - 3325
MST BPDU Rx Count            - 0
MST BPDU Tx Count            - 0
MST CIST TC BPDU Rx Count    - 0
MST CIST TC BPDU Tx Count    - 0
```

5.2.1.76 clear spantree debug

Use this command to clear Spanning Tree debug counters.

clear spantree debug

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear Spanning Tree debug counters:

```
Matrix(rw)->clear spantree debug
```

5.2.2 Reviewing and Setting Spanning Tree Port Parameters

Purpose

To display and set Spanning Tree port parameters, including enabling or disabling the Spanning Tree algorithm on one or more ports, displaying designated bridge, port and root information, displaying blocked ports, displaying and setting Spanning Tree port priorities and costs, configuring edge port parameters, and setting point-to-point protocol mode.

Commands

The commands used to review and set Spanning Tree port parameters are listed below and described in the associated section as shown.

- show spantree portenable (Section 5.2.2.1)
- set spantree portenable (Section 5.2.2.2)
- clear spantree portenable (Section 5.2.2.3)
- show spantree portadmin (Section 5.2.2.4)
- set spantree portadmin (Section 5.2.2.5)
- clear spantree portadmin (Section 5.2.2.6)
- set spantree protomigration (Section 5.2.2.7)
- show spantree portstate (Section 5.2.2.8)
- show spantree blockedports (Section 5.2.2.9)
- show spantree portpri (Section 5.2.2.10)
- set spantree portpri (Section 5.2.2.11)
- clear spantree portpri (Section 5.2.2.12)
- set spantree porthello (Section 5.2.2.13)
- clear spantree porthello (Section 5.2.2.14)
- show spantree portcost (Section 5.2.2.15)
- show spantree adminpathcost (Section 5.2.2.16)
- set spantree adminpathcost (Section 5.2.2.17)
- clear spantree adminpathcost (Section 5.2.2.18)

- show spantree adminedge (Section 5.2.2.19)
- set spantree adminedge (Section 5.2.2.20)
- clear spantree adminedge (Section 5.2.2.21)
- show spantree operedge (Section 5.2.2.22)
- show spantree adminpoint (Section 5.2.2.23)
- show spantree operpoint (Section 5.2.2.24)
- set spantree adminpoint (Section 5.2.2.25)
- clear spantree adminpoint (Section 5.2.2.26)

5.2.2.1 show spantree portenable

Use this command to display the port status on one or more Spanning Tree ports.

show spantree portenable [port *port-string*]

Syntax Description

port *port-string*	(Optional) Displays status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, status will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display status for port fe.1.12:

```
Matrix(rw)->show spantree portenable port fe.1.12
Port fe.1.12    has a Port Status of Enabled
```

5.2.2.2 set spantree portenable

Use this command to set the port status on one or more Spanning Tree ports.

set spantree portenable *port-string* {**enable** | **disable**}

Syntax Description

port-string	Specifies the port(s) to enable or disable. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
enable | **disable**	Enables or disables the Spanning Tree port.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable Spanning Tree port fe.1.12:

```
Matrix(rw)->set spantree portenable fe.1.12 enable
```

5.2.2.3 clear spantree portenable

Use this command to reset the default value for one or more Spanning Tree ports to enabled.

clear spantree portenable *port-string*

Syntax Description

port-string	Specifies port(s) to reset. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the default Spanning Tree port status value to enabled on fe.1.12:

```
Matrix(rw)->clear spantree portenable fe.1.12
```

5.2.2.4 show spantree portadmin

Use this command to display the status of the Spanning Tree algorithm on one or more ports.

show spantree portadmin [**port** *port-string*]

Syntax Description

port *port-string*	(Optional) Displays status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, status will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display port admin status for fe.1.7:

```
Matrix(rw)->show spantree portadmin port fe.1.7
Port fe.1.7 has portadmin set to enable
```

5.2.2.5 set spantree portadmin

Use this command to disable or enable the Spanning Tree algorithm on one or more ports.

set spantree portadmin *port-string* **{disable | enable}**

Syntax Description

port-string	Specifies the port(s) for which to enable or disable Spanning Tree. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
disable | **enable**	Disables or enables Spanning Tree.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable Spanning Tree on fe.1.5:

```
Matrix(rw)->set spantree portadmin fe.1.5 disable
```

5.2.2.6 clear spantree portadmin

Use this command to reset the default Spanning Tree admin status to enable on one or more ports.

clear spantree portadmin *port-string*

Syntax Description

port-string	Resets the default admin status on specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the default Spanning Tree admin state to enable on fe.1.12:

```
Matrix(rw)->clear spantree portadmin fe.1.12
```

5.2.2.7 set spantree protomigration

Use this command to reset the protocol state migration machine for one or more Spanning Tree ports. When operating in RSTP mode, this forces a port to transmit MSTP BPDUs.

set spantree protomigration *port-string* **true**

Syntax Description

port-string	Specifies the port(s) for which protocol migration mode will be enabled. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
true	Enables protocol migration mode.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the protocol state migration machine on fe.1.12:

```
Matrix(rw)->set spantree protomigration fe.1.12 true
```

5.2.2.8 show spantree portstate

Use this command to display the state (blocking, forwarding, etc.) for a port on one or more Spanning Trees.

show spantree portstate [**port** *port-string*] [**sid** *sid*]

Syntax Description

port *port-string*	(Optional) Displays the Spanning Tree state for specific Spanning Tree port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
sid *sid*	(Optional) Displays the state for a specific Spanning Tree identifier. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Command Defaults

- If *port-string* is not specified, current state will be displayed for all Spanning Tree ports.
- If *sid* is not specified, current port state will be displayed for Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the Spanning Tree state for fe.1.7:

```
Matrix(rw)->show spantree portstate port fe.1.7
Port fe.1.7 has a Port State of Forwarding on SID 0
```

5.2.2.9 show spantree blockedports

Use this command to display the blocked ports in a Spanning Tree. A port in this state does not participate in the transmission of frames, thus preventing duplication arising through multiple paths existing in the active topology of the bridged LAN. It receives Spanning Tree configuration messages, but does not forward packets.

show spantree blockedports [*sid*]

Syntax Description

sid	(Optional) Displays blocked ports on a specific Spanning Tree. Valid values are **0 - 4094**. If not specified, SID 0 is assumed.

Command Defaults

If *sid* is not specified, blocked ports will be displayed for Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display blocked ports on SID 1:

```
Matrix(rw)->show spantree blockedports 1

SID   Port
---   ---------
1     fe.1.1
1     fe.1.3
1     fe.1.5

Number of blocked ports in SID 1 : 3
```

5.2.2.10 show spantree portpri

Use this command to show the Spanning Tree priority for one or more ports. Port priority is a component of the port ID, which is one element used in determining Spanning Tree port roles.

show spantree portpri [**port** *port-string*] [**sid** *sid*]

Syntax Description

port *port-string*	(Optional) Specifies the port(s) for which to display Spanning Tree priority. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
sid *sid*	(Optional) Displays port priority for a specific Spanning Tree identifier. Valid values are **0 - 4094**. If not specified, SID 0 is assumed.

Command Defaults

- If *port-string* is not specified, port priority will be displayed for all Spanning Tree ports.
- If *sid* is not specified, port priority will be displayed for Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the port priority for fe.2.7:

```
Matrix(rw)->show spantree portpri port fe.2.7
Port fe.2.7 has a Port Priority of 128 on SID 0
```

5.2.2.11 set spantree portpri

Use this command to set a port's Spanning Tree priority.

set spantree portpri *port-string priority* [**sid** *sid*]

Syntax Description

port-string	Specifies the port(s) for which to set Spanning Tree port priority. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
priority	Specifies a number that represents the priority of a link in a Spanning Tree bridge. Valid values are from **0** to **240** (in increments of 16) with 0 indicating high priority.
sid *sid*	(Optional) Sets port priority for a specific Spanning Tree identifier. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Command Defaults

If *sid* is not specified, port priority will be set for Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the priority of fe.1.3 to 240 on SID 1:

```
Matrix(rw)->set spantree portpri fe.1.3 240 sid 1
```

5.2.2.12 clear spantree portpri

Use this command to reset the bridge priority of a Spanning Tree port to a default value of 128.

clear spantree portpri *port-string* [**sid** *sid*]

Syntax Description

port-string	Specifies the port(s) for which to set Spanning Tree port priority. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
sid *sid*	(Optional) Resets the port priority for a specific Spanning Tree identifier. Valid values are **0 - 4094**. If not specified, SID 0 will be assumed.

Command Defaults

If *sid* is not specified, port priority will be set for Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the priority of fe.1.3 to 128 on SID 1:

```
Matrix(rw)->clear spantree portpri fe.1.3 sid 1
```

5.2.2.13 set spantree porthello

Use this command to set the hello time for one or more Spanning Tree ports. This is the time interval (in seconds) the port(s) will transmit BPDUs.

set spantree porthello *port-string interval*

NOTE: This command can be executed only if bridge hello mode is disabled. For information on using the **set spantree bridgehellomode** command, refer to Section 5.2.1.28.

Syntax Description

port-string	Specifies the port(s) for which to set hello time.
interval	Specifies the number of seconds the system waits before broadcasting a bridge hello message. Valid values are **1 - 10.**

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the hello time to 3 seconds for port fe.1.4:

```
Matrix(rw)->set spantree porthello fe.1.4 3
```

5.2.2.14 clear spantree porthello

Use this command to reset the hello time for one or more Spanning Tree ports to the default of 2 seconds.

clear spantree porthello *port-string*

Syntax Description

port-string	Specifies the port(s) for which to reset hello time.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the hello time to 2 seconds for port fe.1.4:

```
Matrix(rw)->clear spantree porthello fe.1.4
```

5.2.2.15 show spantree portcost

Use this command to display cost values assigned to one or more Spanning Tree ports.

show spantree portcost [**port** *port-string*] [**sid** *sid*]

Syntax Description

port *port-string*	(Optional) Displays cost values for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
sid *sid*	(Optional) Displays port cost for a specific Spanning Tree identifier. Valid values are **0 - 4094**. If not specified, SID 0 will be assumed.

Command Defaults

- If *port-string* is not specified, port cost will be displayed for all Spanning Tree ports.
- If *sid* is not specified, port cost will be displayed for all Spanning Trees.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the port cost for fe.2.5:

```
Matrix(rw)->show spantree portcost port fe.2.5
Port fe.2.5 has a Port Path Cost of 2000000 on SID 0
```

5.2.2.16 show spantree adminpathcost

Use this command to display the admin path cost for a port on one or more Spanning Trees.

show spantree adminpathcost [**port** *port-string*] [**sid** *sid*]

Syntax Description

port *port-string*	(Optional) Displays the admin path cost value for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
sid *sid*	(Optional) Displays the admin path cost for a specific Spanning Tree identifier. Valid values are **0 - 4094**. If not specified, SID 0 will be assumed.

Command Defaults

- If *port-string* is not specified, admin path cost for all Spanning Tree ports will be displayed.
- If *sid* is not specified, admin path cost for Spanning Tree 0 will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the admin path cost for fe.3.4 on SID 1:

```
Matrix(rw)->show spantree adminpathcost port fe.3.4 sid 1
Port fe.3.4 has a Port Admin Path Cost of 0 on SID 1
```

5.2.2.17 set spantree adminpathcost

Use this command to set the administrative path cost on a port and one or more Spanning Trees.

set spantree adminpathcost *port-string cost* [**sid** *sid*]

NOTE: By default, this value is set to 0, which forces the port to recalculate Spanning Tree path cost based on the speed of the port and whether or not legacy path cost is enabled. For details on using the **set spantree legacypathcost** command, refer to Section 5.2.1.43.

Syntax Description

port-string	Specifies the port(s) on which to set an admin path cost. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
cost	Specifies the port path cost. Va1id values are: • **0 - 65535** if legacy path cost is enabled. • **0 - 200000000** if legacy path cost is disabled.
sid *sid*	(Optional) Sets the admin path cost for a specific Spanning Tree identifier. Valid values are **0 - 4094**. If not specified, SID 0 will be assumed.

Command Defaults

If *sid* is not specified, admin path cost will be set for Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the admin path cost to 200 for fe.3.2 on SID 1:

```
Matrix(rw)->set spantree adminpathcost fe.3.2 200 sid 1
```

5.2.2.18 clear spantree adminpathcost

Use this command to reset the Spanning Tree default value for port admin path cost to 0.

clear spantree adminpathcost *port-string* [**sid** *sid*]

Syntax Description

port-string	Specifies the port(s) for which to reset admin path cost. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
sid *sid*	(Optional) Resets the admin path cost for specific Spanning Tree(s). Valid values are **0 - 4094**. If not specified, SID 0 is assumed.

Command Defaults

If *sid* is not specified, admin path cost will be reset for Spanning Tree 0.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the admin path cost to 0 for fe.3.2 on SID 1:

```
Matrix(rw)->clear spantree adminpathcost fe.3.2 sid 1
```

5.2.2.19 show spantree adminedge

Use this command to display the edge port administrative status for a port.

show spantree adminedge [**port** *port-string*]

Syntax Description

port-string	(Optional) Displays edge port administrative status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified edge port administrative status will be displayed for all Spanning Tree ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the edge port status for fe.3.2:

```
Matrix(rw)->show spantree adminedge port fe.3.2
Port fe.3.2 has a Port Admin Edge of Edge-Port
```

5.2.2.20 set spantree adminedge

Use this command to set the edge port administrative status on a Spanning Tree port.

set spantree adminedge *port-string* **{true | false}**

Syntax Description

port-string	Specifies the edge port. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
true | false	Enables (**true**) or disables (**false**) the specified port as a Spanning Tree edge port.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set fe.1.11 as an edge port:

```
Matrix(rw)->set spantree adminedge fe.1.11 true
```

5.2.2.21 clear spantree adminedge

Use this command to reset a Spanning Tree port to non-edge status.

clear spantree adminedge *port-string*

Syntax Description

port-string	Specifies port(s) on which to reset edge port status. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset fe.1.11 as a non-edge port:

```
Matrix(rw)->clear spantree adminedge fe.1.11
```

5.2.2.22 show spantree operedge

Use this command to display the Spanning Tree edge port operating status for a port.

show spantree operedge [**port** *port-string*]

Syntax Description

port *port-string*	(Optional) Displays edge port operating status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified edge port operating status will be displayed for all Spanning Tree ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the edge port status for fe.2.7:

```
Matrix(rw)->show spantree operedge port fe.2.7
Port fe.2.7 has a Port Oper Edge of Edge-Port
```

5.2.2.23 show spantree adminpoint

Use this command to display the administrative point-to-point status of the LAN segment attached to a Spanning Tree port.

show spantree adminpoint [**port** *port-string*]

Syntax Description

port *port-string*	(Optional) Displays point-to-point status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, status will be displayed for all Spanning Tree port(s).

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the point-to-point status of the LAN segment attached to fe.2.7:

```
Matrix(rw)->show spantree adminpoint port fe.2.7
Port fe.2.7 has a Port Admin Point to Point of Auto
```

5.2.2.24 show spantree operpoint

Use this command to display the operating point-to-point status of the LAN segment attached to a port.

show spantree operpoint [**port** *port-string*]

Syntax Description

port *port-string*	(Optional) Displays point-to-point operating status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If not specified, status will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the point-to-point status operating of the LAN segment attached to fe.2.7:

```
Matrix(rw)->show spantree operpoint port fe.2.7
Port fe.2.7 has a Port Oper Point to Point of False on SID 1
```

5.2.2.25 set spantree adminpoint

Use this command to set the administrative point-to-point status of the LAN segment attached to a Spanning Tree port.

set spantree adminpoint *port-string* **{true | false | auto}**

Syntax Description

port-string	Specifies the port on which to set point-to-point protocol status. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
true | false | auto	Specifies the point-to-point status of the LAN attached to the specified port. • **true** forces the port to be considered point-to-point. • **false** forces the port to be considered non point-to-point. • **auto** (the default setting) allows the firmware to determine the port's point-to-point status.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the LAN attached to fe.1.3 as a point-to-point segment:

```
Matrix(rw)->set spantree adminpoint fe.1.3 true
```

5.2.2.26 clear spantree adminpoint

Use this command to reset the administrative point-to-point status of the LAN segment attached to a Spanning Tree port to auto mode.

clear spantree adminpoint *port-string*

Syntax Description

port-string	Specifies port(s) on which to reset point-to-point protocol status. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset point-to-point status to auto on fe.2.3:

```
Matrix(rw)->clear spantree adminpoint fe.2.3
```

6

802.1Q VLAN Configuration

This chapter describes the Matrix system's capabilities to implement 802.1Q virtual LANs (VLANs). It documents how to:

- Create, enable, disable and name a VLAN.
- Review status and other information related to VLANs.
- Assign ports to a VLAN and filter unwanted frames on one or more ports
- Assign a VLAN to a MIB-II interface in order to view statistics for the VLAN
- Use GVRP (GARP VLAN Registration Protocol) to control and propagate VLAN knowledge through the network.
- Create a secure VLAN for device management security.

NOTE: The device can support up to 4094 802.1Q VLANs. The allowable range for VLANs is 2 to 4094. As a default, all ports on the device are assigned to VLAN ID 1, untagged.

6.1 VLAN CONFIGURATION SUMMARY

Virtual LANs allow the network administrator to partition network traffic into logical groups and control the flow of that traffic through the network. Once the traffic and, in effect, the users creating the traffic, are assigned to a VLAN, then broadcast and multicast traffic is contained within the VLAN and users can be allowed or denied access to any of the network's resources. Also, some or all of the ports on the device can be configured as GVRP ports, which enable frames received with a particular VLAN ID and protocol to be transmitted on a limited number of ports. This keeps the traffic associated with a particular VLAN and protocol isolated from the other parts of the network.

6.1.1 Port Assignment Scheme

For information on this device's port assignment scheme, refer to Section 3.1.1.

6.1.2 Port String Syntax Used in the CLI

For information on how to designate port numbers in the CLI syntax, refer to Section 3.1.1.

6.2 PROCESS OVERVIEW: 802.1Q VLAN CONFIGURATION

Use the following steps as a guide to configure VLANs on the device (refer to the associated section in parentheses):

1. Review existing VLANs (Section 6.3.1)
2. Create and name VLANs (Section 6.3.2)
3. Assign port VLAN IDs and ingress filtering (Section 6.3.3)
4. Configure VLAN Egress (Section 6.3.4)
5. Create a secure management VLAN (Section 6.3.5)
6. Enable / Disable GVRP (GARP VLAN Registration Protocol) (Section 6.3.6)

Preparing for VLAN Configuration

A little forethought and planning is essential to a good VLAN implementation. Before attempting to configure a single device for VLAN operation, consider the following:

- How many VLANs will be required?
- What stations will belong to them?
- What ports are connected to those stations?
- What ports will be configured as GVRP-aware ports?

It is also helpful to sketch out a diagram of your VLAN strategy.

6.3 VLAN CONFIGURATION COMMAND SET

6.3.1 Reviewing Existing VLANs

Purpose

To display a list of VLANs currently configured on the device, to determine how one or more VLANs were created, the ports allowed and disallowed to transmit traffic belonging to VLAN(s), and if those ports will transmit the traffic with a VLAN tag included.

Command

The command needed to review existing VLANs is listed below and described in the associated section as shown.

- show vlan (Section 6.3.1.1)

6.3.1.1 show vlan

Use this command to display all information related to one or more VLANs.

show vlan [static] [*vlan-list*]

Syntax Description

static	(Optional) Displays information related to static VLANs. Static VLANs are manually created using the **set vlan** command (Section 6.3.2.1), SNMP MIBs, or the WebView management application. The default VLAN, VLAN 1, is always statically configured and can't be deleted. Only ports that use a specified VLAN as their default VLAN (PVID) will be displayed.
vlan-list	(Optional) Displays information for a specific VLAN or range of VLANs.

Command Defaults

If no options are specified, all information related to static and dynamic VLANs will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display information for VLAN 1. In this case, VLAN 1 is named "DEFAULT VLAN" and it is enabled to operate. Ports allowed to transmit frames belonging to VLAN 1 are listed as egress ports. Ports that won't include a VLAN tag in their transmitted frames are listed as untagged ports. There are no forbidden ports (prevented from transmitted frames) on VLAN 1:

```
Matrix(rw)->show vlan 1
 VLAN: 1         NAME: DEFAULT VLAN                      Status: Enabled
 VLAN Type: Permanent    FID: 1
 Creation Time: 4 days 9 hours 4 minutes 50 seconds ago
 Egress Ports
host.0.1, fe.1.1-10, ge.2.1-4, fe.3.1-7, lag.0.1-32
 Forbidden Egress Ports
None.
 Untagged Ports
host.0.1, fe.1.1-10, ge.2.1-4, fe.3.1-7, lag.0.1-32
```

Table 6-1 provides an explanation of the command output.

Table 6-1 show vlan Output Details

Output	What It Displays...
VLAN	VLAN ID.
NAME	Name assigned to the VLAN.
Status	Whether it is **enabled** or **disabled**.
VLAN Type	Whether it is **permanent** (static) or **dynamic**.
FID	Filter Database ID of which this VLAN is a member.
Creation Time	Time elapsed since the VLAN was created.
Egress Ports	Ports configured to transmit frames for this VLAN.
Forbidden Egress Ports	Ports prevented from transmitted frames for this VLAN.
Untagged Ports	Ports configured to transmit untagged frames for this VLAN.

6.3.2 Creating and Naming Static VLANs

Purpose

To create a new static VLAN, or to enable or disable existing VLAN(s).

Commands

The commands used to create and name static VLANs are listed below and described in the associated section as shown.

- set vlan (Section 6.3.2.1)
- set vlan name (Section 6.3.2.2)
- clear vlan (Section 6.3.2.3)
- clear vlan name (Section 6.3.2.4)

6.3.2.1 set vlan

Use this command to create a new static IEEE 802.1Q VLAN, or to enable or disable an existing VLAN. Once a VLAN is created, you can assign it a name using the **set vlan name** command described in Section 6.3.2.2.

NOTES: Each VLAN ID must be unique. If a duplicate VLAN ID is entered, the device assumes that the Administrator intends to modify the existing VLAN.

Enter the VLAN ID using a unique number between 2 and 4094. The VLAN IDs of 0, 1, and 4094 and higher may not be used for user-defined VLANs.

set vlan {create | enable | disable} *vlan-list*

Syntax Description

create | enable | disable	Creates, enables or disables VLAN(s).
vlan-list	Specifies one or more VLAN IDs to be created, enabled or disabled.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to create VLAN 3:

```
Matrix(rw)->set vlan create 3
```

This example shows how to disable VLAN 3:

```
Matrix(rw)->set vlan disable 3
```

6.3.2.2 set vlan name

Use this command to set or change the ASCII name for a new or existing VLAN.

set vlan name *vlan-list vlan-name*

Syntax Description

vlan-list	Specifies the VLAN ID of the VLAN(s) to be named.
vlan-name	Specifies the string used as the name of the VLAN (1 to 32 characters).

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the name for VLAN 7 to green:

```
Matrix(rw)->set vlan name 7 green
```

6.3.2.3 clear vlan

Use this command to remove a static VLAN from the list of VLANs recognized by the device.

clear vlan *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN ID of the VLAN(s) to be removed.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove a static VLAN 9 from the device's VLAN list:

```
Matrix(rw)->clear vlan 9
```

6.3.2.4 clear vlan name

Use this command to remove the name of a VLAN from the VLAN list.

clear vlan name *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN ID of the VLAN(s) for which the name will be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the name for VLAN 9:

```
Matrix(rw)->clear vlan name 9
```

6.3.3 Assigning Port VLAN IDs (PVIDs) and Ingress Filtering

About PVIDs and Policy Classification to a VLAN

Port VLAN IDs (PVIDs) assign VLAN IDs to untagged frames on one or more ports. Using the **set port vlan** command as described in Section 6.3.3.2, you can, for example, assign ports 1, 5, 8, and 9 to VLAN 3. Untagged frames received on those ports will be assigned to VLAN 3. (By default, all ports are members of VLAN ID 1, the default VLAN.)

Policy classification to a VLAN, as described in Chapter 7, Section 7.3.2.4, takes precedence over PVID assignment if:

- Policy classification is configured to a VLAN as described in Section 7.3.2.4, and
- PVID override has been enabled for a policy profile, and assigned to port(s) associated with the PVID as described in Section 7.3.1.2.

For more information about configuring user policy profiles, including PVID override, protocol-based policy classification a VLAN or Class of Service, and assigning ports to policy profiles, refer to Chapter 7.

Purpose

To assign default VLAN IDs to untagged frames on one or more ports, to configure MIB-II interface mapping to a VLAN, to configure VLAN ingress filtering, and to set the frame discard mode.

Commands

The commands used to configure port VLAN IDs and ingress filtering are listed below and described in the associated section as shown.

- show port vlan (Section 6.3.3.1)
- set port vlan (Section 6.3.3.2)
- clear port vlan (Section 6.3.3.3)
- show vlan interface (Section 6.3.3.4)
- set vlan interface (Section 6.3.3.5)
- clear vlan interface (Section 6.3.3.6)
- show port ingress filter (Section 6.3.3.7)
- set port ingress filter (Section 6.3.3.8)

- show port discard (Section 6.3.3.9)
- set port discard (Section 6.3.3.10)
- clear port discard (Section 6.3.3.11)

6.3.3.1 show port vlan

Use this command to display port VLAN identifier (PVID) information. PVID determines the VLAN to which all untagged frames received on one or more ports will be classified.

show port vlan [*port-string*]

Syntax Description

port-string	(Optional) Displays PVID information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port -string* is not specified, port VLAN information for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display PVIDs assigned to Fast Ethernet ports 1 through 6 in module 2. In this case, untagged frames received on these ports will be classified to VLAN 1:

```
Matrix(rw)->show port vlan fe.2.1-6
fe.2.1 is set to 1
fe.2.2 is set to 1
fe.2.3 is set to 1
fe.2.4 is set to 1
fe.2.5 is set to 1
fe.2.6 is set to 1
```

6.3.3.2 set port vlan

Use this command to configure the PVID (port VLAN identifier) for one or more ports. The PVID is used to classify untagged frames as they ingress into a given port. If the specified VLAN has not already been created, this command will create it. It will prompt the user to add the VLAN to the port's egress list as untagged, and remove the default VLAN from the port's egress list.

NOTE: For information on how to configure protocol-based policy classification to a VLAN, including how to configure a VLAN policy to override PVID, refer to Chapter 7.

set port vlan *port-string pvid* [**modify-egress** | **no-modify-egress**]

Syntax Description

port-string	Specifies the port(s) for which to configure a VLAN identifier. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
pvid	Specifies the VLAN ID of the VLAN to which port(s) will be added.
modify-egress | **no-modify-egress**	(Optional) Adds port(s) to VLAN's untagged egress list and removes them from other untagged egress lists, or does not prompt for or make egress list changes

Command Defaults

If not specified, the egress list will be modified.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to add fe.1.10 to the port VLAN list of VLAN 4 (PVID 4). Since VLAN 4 is a new VLAN, it is created. Then port fe.1.10 is added to VLAN 4's untagged egress list, and is cleared from the egress list of VLAN 1 (the default VLAN):

```
Matrix(rw)->set port vlan fe.1.10 4
Matrix(rw)->set vlan 4 create
Matrix(rw)->set vlan egress 4 fe.1.10 untagged
Matrix(rw)->clear vlan egress 1 fe.1.10
```

6.3.3.3 clear port vlan

Use this command to reset a port's 802.1Q port VLAN ID (PVID) to the host VLAN ID 1.

clear port vlan *port-string*

Syntax Description

port-string	Specifies the port(s) to be reset to the host VLAN ID 1. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the Fast Ethernet ports 3 and 11 in module1 to a VLAN ID of 1 (Host VLAN):

```
Matrix(rw)->clear port vlan fe.1.3,fe.1.11
```

6.3.3.4 show vlan interface

Use this command to display the MIB-II interface entry mapped to a VLAN.

show vlan interface [*vlan-list*]

Syntax Description

vlan-list	Displays the MIB2 interface entry for specific VLAN(s).

Command Defaults

If *vlan-list* is not specified, MIB2 interface entries will be displayed for all VLANs.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the interface entry for VLAN 1:

```
Matrix(rw)->show vlan interface 1
VLAN       Port          Storage Type
-------------------------------------
  1      vlan.0.1        non-volatile
```

Table 6-2 provides an explanation of the command output.

Table 6-2 show vlan interface Output Details

Output	What It Displays...
VLAN	VLAN ID.
Port	Port-string designation.
Storage Type	Whether the entry is stored as a **volatile** or **non-volatile** entry. Volatile entries are lost when a system is reset. Non-volatile entries are saved in NVRAM and are persistent until cleared.

6.3.3.5 set vlan interface

Use this command to create, disable or enables a MIB-II interface mapped to a VLAN.

set vlan interface *vlan-list* {**create** | **disable** | **enable**} [**volatile**]

Syntax Description

vlan-list	Specifies the VLAN(s) for which an interface entry will be created, disabled or enabled.
create | **disable** | **enable**	Creates, disables or enables an interface entry.
volatile	(Optional) When the **create** keyword is used, stores the entry as a volatile entry. Volatile entries are lost when a system is reset. Non-volatile entries are saved in NVRAM and are persistent until cleared.

Command Defaults

If **volatile** is not specified, entries will be created as nonvolatile.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create a volatile interface entry mapped to VLAN 1:

```
Matrix(rw)->set vlan interface 1 volatile
```

6.3.3.6 clear vlan interface

Use this command to clear the MIB-II interface entry mapped to a VLAN.

clear vlan interface *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN(s) for which an interface entry will be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the interface entry mapped to VLAN 1:

```
Matrix(rw)->clear vlan interface 1
```

6.3.3.7 show port ingress filter

Use this command to show all ports that are enabled for port ingress filtering, which limits incoming VLAN ID frames according to a port VLAN egress list. If the VLAN ID specified in the received frame is not on the port's VLAN egress list, then that frame is dropped and not forwarded.

show port ingress-filter [*port-string*]

Syntax Description

port-string	(Optional) Specifies the port(s) for which to display ingress filtering status. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, ingress filtering status for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the port ingress filter status for Fast Ethernet ports 10 through 15 in module 1. In this case, the ports are disabled for ingress filtering:

```
Matrix(rw)->show port ingress-filter fe.1.10-15
   Port      State
 --------  ---------
  fe.1.10  disabled
  fe.1.11  disabled
  fe.1.12  disabled
  fe.1.13  disabled
  fe.1.14  disabled
  fe.1.15  disabled
```

6.3.3.8 set port ingress filter

Use this command to discard all frames received with a VLAN ID that don't match the port's VLAN egress list. When ingress filtering is enabled on a port, the VLAN IDs of incoming frames are compared to the port's egress list. If the received VLAN ID does not match a VLAN ID on the port's egress list, then the frame is dropped.

Ingress filtering is implemented according to the IEEE 802.1Q standard.

set port ingress-filter *port-string* {**disable | enable**}

Syntax Description

port-string	Specifies the port(s) on which to enable of disable ingress filtering. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
disable | enable	Disables or enables ingress filtering.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable port ingress filtering on Fast Ethernet port 3 in module 1:

```
Matrix(rw)->set port ingress-filter fe.1.3 enable
```

6.3.3.9 show port discard

Use this command to display the frame discard mode for one or more ports. Ports can be set to discard frames based on whether or not they contain a VLAN tag. They can also be set to discard both frame types or none of the frames received.

show port discard [*port-string*]

Syntax Description

port-string	(Optional) Displays the frame discard mode for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, frame discarded mode will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the frame discard mode for Fast Ethernet port 7 in module 2. In this case, the port has been set to discard all tagged frames:

```
Matrix(rw)->show port discard fe.2.7
 Port          Discard Mode
------------  -------------
 fe.2.7          tagged
```

6.3.3.10 set port discard

Use this command to set the frame discard mode on one or more ports.

set port discard *port-string* {**tagged** | **untagged** | **none** | **both**}

Syntax Description

port-string	Specifies the port(s) for which to set frame discard mode. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
tagged | **untagged** | **none** | **both**	Sets the port(s) to discard tagged or untagged frames, no frames, or both types of frames.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set Fast Ethernet port 7 in module2 to discard both tagged and untagged frames:

```
Matrix(rw)->set port discard fe.2.7 both
```

6.3.3.11 clear port discard

Use this command to reset the frame discard mode to the factory default setting (none).

clear port discard *port-string*

Syntax Description

port-string	Specifies the port(s) for which to reset frame discard mode. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset Fast Ethernet port 7 in module module2 to the default discard mode of “none”:

```
Matrix(rw)->clear port discard fe.2.7
```

6.3.4 Configuring the VLAN Egress List

Purpose

To assign or remove ports on the egress list of a particular VLAN. This determines which ports will be eligible to transmit frames for a particular VLAN. For example, ports 1, 5, 9, 8 could be assigned to transmit frames belonging to VLAN 5 (VLAN ID=5).

The port egress type for all ports defaults to tagging transmitted frames, but can be changed to forbidden or untagged. In general, VLANs have no egress (except for VLAN 1) until they are configured by static administration, or through dynamic mechanisms (i.e., GVRP, policy classification or Enterasys dynamic egress).

Setting a port to forbidden prevents it from participating in the specified VLAN and ensures that any dynamic requests (either through GVRP or dynamic egress) for the port to join the VLAN will be ignored. Setting a port to untagged allows it to transmit frames without a tag header. This setting is usually used to configure a port connected to an end user device.

The default VLAN defaults its egress to untagged for all ports.

Commands

The commands used to configure VLAN egress and dynamic VLAN egress are listed below and described in the associated section as shown.

- show port egress (Section 6.3.4.1)
- set vlan egress (Section 6.3.4.2)
- clear vlan egress (Section 6.3.4.3)
- show vlan dynamicegress (Section 6.3.4.4)
- set vlan dynamicegress (Section 6.3.4.5)

6.3.4.1 show port egress

Use this command to display the VLAN membership for one or more ports.

show port egress [*port-string*]

Syntax Description

port-string	(Optional) Displays VLAN membership for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, VLAN membership will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows you how to show VLAN egress information for Fast Ethernet ports 1 through 3 in module 1. In this case, all three ports are allowed to transmit VLAN 1 frames as tagged and VLAN 10 frames as untagged. Both are static VLANs:

```
Matrix(rw)->show port egress fe.1.1-3
 Port      Vlan          Egress     Registration
Number      Id           Status       Status
-------------------------------------------------------
fe.1.1       1            tagged       static
fe.1.1      10          untagged      static
fe.1.2       1            tagged       static
fe.1.2      10          untagged      static
fe.1.3       1            tagged       static
fe.1.3      10          untagged      static
```

6.3.4.2 set vlan egress

Use this command to add ports to the VLAN egress list for the device, or to prevent one or more ports from participating in a VLAN. This determines which ports will transmit frames for a particular VLAN.

set vlan egress *vlan-list port-string* [**untagged** | **forbidden** | **tagged**]

Syntax Description

vlan-list	Specifies the VLAN where a port(s) will be added to the egress list.
port-string	Specifies one or more ports to add to the VLAN egress list of the specified *vlan-list*. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
untagged | **forbidden** | **tagged**	(Optional) Adds the specified ports as: • **untagged** — Causes the port(s) to transmit frames without an IEEE 802.1Q header tag. • **forbidden** — Instructs the device to ignore dynamic requests (either through GVRP or dynamic egress) from the port(s) to join the VLAN and disallows egress on that port. • **tagged** — Causes the port(s) to transmit 802.1Q tagged frames.

Command Defaults

If **untagged, forbidden** or **tagged** is not specified, the port will be added to the VLAN egress list as tagged.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to add Fast Ethernet ports 5 through 10 in module 1 to the egress list of VLAN 7. This means that these ports will transmit VLAN 7 frames as tagged:

```
Matrix(rw)->set vlan egress 7 fe.1.5-10
```

This example shows how to forbid Fast Ethernet ports 13 through 15 in module 1 from joining VLAN 7 and disallow egress on those ports:

```
Matrix(rw)->set vlan egress 7 fe.1.13-15 forbidden
```

This example shows how to allow Fast Ethernet port 2 in module 1 to transmit VLAN 7 frames as untagged:

```
Matrix(rw)->set vlan egress 7 fe.1.2 untagged
```

6.3.4.3 clear vlan egress

Use this command to remove ports from a VLAN's egress list.

clear vlan egress *vlan-list port-string* [**forbidden**]

Syntax Description

vlan-list	Specifies the number of the VLAN from which a port(s) will be removed from the egress list.
port-string	Specifies one or more ports to be removed from the VLAN egress list of the specified *vlan-list*. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
forbidden	(Optional) Clears the forbidden setting from the specified port(s) and resets the port(s) as able to egress frames if so configured by either static or dynamic means.

Command Defaults

If **forbidden** is not specified, tagged and untagged settings will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to remove Fast Ethernet port 14 in module 3 from the egress list of VLAN 9:

```
Matrix(rw)->clear vlan egress 9 fe.3.14
```

This example shows how to remove all Fast Ethernet ports in module 2 from the egress list of VLAN 4:

```
Matrix(rw)->clear vlan egress 4 fe.2.*
```

6.3.4.4 show vlan dynamic egress

Use this command to display which VLANs are currently enabled for VLAN dynamic egress.

show vlan dynamicegress [*vlan-list*]

Syntax Description

vlan-list	(Optional) Displays dynamic egress status for specific VLAN(s).

Command Defaults

If *vlan-list* is not specified, status for all VLANs where dynamic egress is enabled will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display which VLANs are enabled for dynamic egress:

```
Matrix(rw)->show vlan dynamicegress
VLAN 1 is enabled
VLAN 101 is enabled
VLAN 102 is enabled
VLAN 105 is enabled
```

6.3.4.5 set vlan dynamicegress

Use this command to set the administrative status of one or more VLANs' dynamic egress capability. If VLAN dynamic egress is enabled, the device will add the port receiving a tagged frame to the VLAN egress list of the port according to the frame VLAN ID.

set vlan dynamicegress *vlan-list* {**enable | disable**}

Syntax Description

vlan-list	Specifies the number of the VLAN(s) where dynamic egress will be enabled or disabled.
enable | disable	Enables or disables dynamic egress.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the dynamic egress function on VLAN 7:

```
Matrix(rw)->set vlan dynamicegress 7 enable
```

6.3.5 Creating a Secure Management VLAN

If the Matrix Series device is to be configured for multiple VLAN's, it may be desirable to configure a management-only VLAN. This allows a station connected to the management VLAN to manage the device. It also makes management secure by preventing configuration via ports assigned to other VLANs.

To create a secure management VLAN, you must:

1. Create a new VLAN. (Section 6.3.2.1)
2. Set the PVID for the host port and the desired switch port to the VLAN created in Step 1. (Section 6.3.3.2)
3. Add the host port and the desired switch port to the egress list for the VLAN created in Step 1. (Section 6.3.4.2)
4. Set a private community name and access policy. (Section 4.3.2.8)

The commands used to create a secure management VLAN are listed in Table 6-3 and described in the associated section as shown.

NOTES: By default at device startup, there is one VLAN configured on the Matrix Series device. It is VLAN ID 1, the DEFAULT VLAN. The default community name, which determines remote access for SNMP management, is set to "public" with read-write access.

This example assumes the management station is attached to fe.1.1 and wants untagged frames.

The process described in this section would be repeated on every device that is connected in the network to ensure that each device has a secure management VLAN.

Table 6-3 Command Set for Creating a Secure Management VLAN

To do this...	Use these commands...
Create a new VLAN and confirm settings.	**set vlan create 2** (Section 6.3.2.1)
	(Optional) **show vlan 2** (Section 6.3.1.1)
Set the PVIDs to the new VLAN.	**set port vlan host.0.1; fe.1.1 2** (Section 6.3.3.2)
Add the ports to the new VLAN's egress list.	**set vlan egress 2 host.0.1; fe.1.1 2 untagged** (Section 6.3.4.2)

Table 6-3 Command Set for Creating a Secure Management VLAN (Continued)

To do this...	Use these commands...
Set a private community name and access policy and confirm settings.	**set snmp community private** (Section 4.3.2.8)
	(Optional) **show snmp community** (Section 4.3.2.7)

6.3.6 Enabling/Disabling GVRP (GARP VLAN Registration Protocol)

Purpose

To dynamically create VLANs across a switched network. The GVRP command set is used to display GVRP configuration information, the current global GVRP state setting, individual port settings (enable or disable) and timer settings. By default, GVRP is enabled on all ports, and globally on the device.

More About GARP VLAN Registration Protocol (GVRP)

The following sections describe the device operation when its ports are operating under the Generic Attribute Registration Protocol (GARP) application – GARP VLAN Registration Protocol (GVRP).

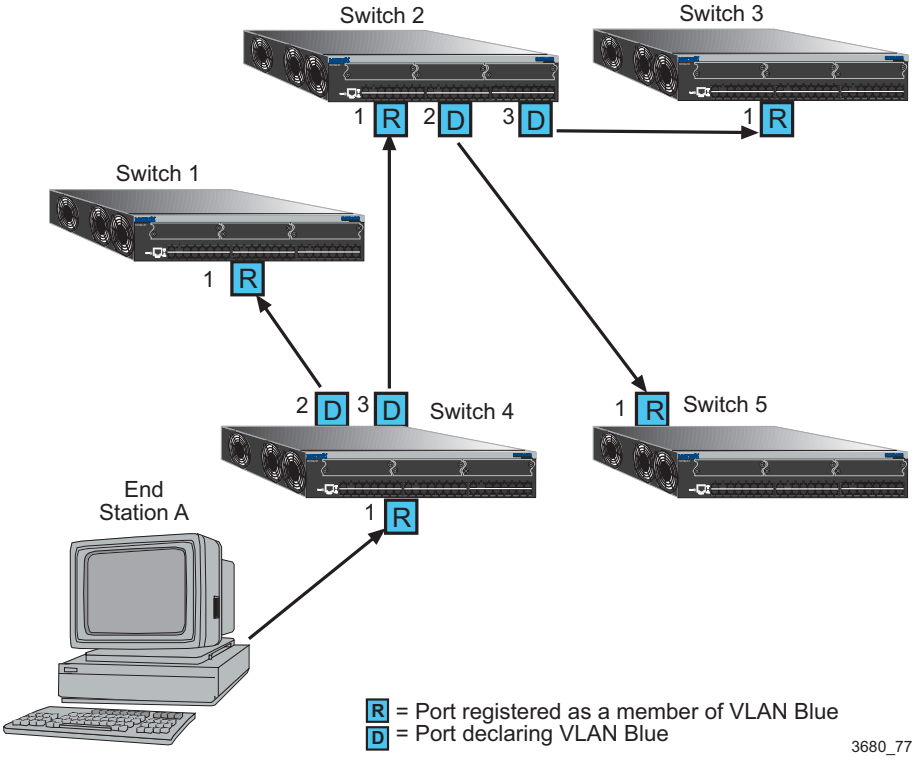
Overview

The purpose of GVRP is to dynamically create VLANs across a switched network. When a VLAN is declared, the information is transmitted out GVRP configured ports on the device in a GARP formatted frame using the GVRP multicast MAC address. A switch/router that receives this frame, examines the frame, and extracts the VLAN IDs. GVRP then creates the VLANs and adds the receiving port to its tagged member list for the extracted VLAN ID (s). The information is then transmitted out the other GVRP configured ports of the device. Figure 6-1 shows an example of how VLAN blue from end station A would be propagated across a switch/router network.

How It Works

In Figure 6-1, Device 4, port 1 is registered as being a member of VLAN Blue and then declares this fact out all its ports (2 and 3) to Device 1 and Device 2. These two devices register this in the port egress lists of the ports (Device 1, port 1 and Device 2, port 1) that received the frames with the information. Device 2, which is connected to Device 3 and Device 5 declares the same information to those two devices and the port egress list of each port is updated with the new information, accordingly.

Figure 6-1 Example of VLAN Propagation via GVRP



Configuring a VLAN on an 802.1Q switch creates a static VLAN entry. The entry will always remain registered and will not time out. However, dynamic entries will time-out and their registrations will be removed from the member list if the end station A is removed. This ensures that, if switches are disconnected or if end stations are removed, the registered information remains accurate.

The end result is that the port egress list of a port is updated with information about VLANs that reside on that port, even if the actual station on the VLAN is several hops away.

Commands

The commands used to configure GVRP are listed below and described in the associated section as shown.

- show gvrp (Section 6.3.6.1)
- show garp timer (Section 6.3.6.2)
- set gvrp (Section 6.3.6.3)
- clear gvrp (Section 6.3.6.4)
- set garp timer (Section 6.3.6.5)
- clear garp timer (Section 6.3.6.6)

6.3.6.1 show gvrp

Use this command to display GVRP configuration information.

show gvrp [*port-string*]

Syntax Description

port-string	(Optional) Displays GVRP configuration information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, GVRP configuration information will be displayed for all ports and the device.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display GVRP status for the device and for Fast Ethernet port 1 in module 2:

```
Matrix(rw)->show gvrp fe.2.1
Global GVRP status is enabled.

Port Number    GVRP status    Last PDU Origin
-----------    -----------    -----------------
fe.2.1         enabled        00-e0-63-97-d4-36
```

Table 6-4 provides an explanation of the command output.

Table 6-4 show gvrp Output Details

Output	What It Displays...
Port Number	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Table 6-4 show gvrp Output Details (Continued)

Output	What It Displays...
GVRP status	Whether GVRP is enabled or disabled on the port.
Last PDU Origin	MAC address of the last GVRP frame received on the port.

6.3.6.2 show garp timer

Use this command to display GARP timer values for one or more ports.

show garp timer [*port-string*]

Syntax Description

port-string	(Optional) Displays GARP timer information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, GARP timer information will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display GARP timer information on Fast Ethernet ports 1 through 10 in module 1:

NOTE: For a functional description of the terms **join**, **leave**, and **leaveall** timers, refer to the standard IEEE 802.1Q documentation, which is not supplied with this device.

```
Matrix(rw)->show garp timer fe.1.1-10
 Port based GARP Configuration: (Timer units are centiseconds)
 Port Number     Join         Leave      Leaveall
 -----------  ----------  ----------  ----------
 fe.1.1             20          60         1000
 fe.1.2             20          60         1000
 fe.1.3             20          60         1000
 fe.1.4             20          60         1000
 fe.1.5             20          60         1000
 fe.1.6             20          60         1000
 fe.1.7             20          60         1000
 fe.1.8             20          60         1000
 fe.1.9             20          60         1000
 fe.1.10            20          60         1000
```

Table 6-5 provides an explanation of the command output. For details on using the **set gvrp** command to enable or disable GVRP, refer to Section 6.3.6.3. For details on using the **set garp timer** command to change default timer values, refer to Section 6.3.6.5.

Table 6-5 show gvrp configuration Output Details

Output	What It Displays...
Port Number	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
Join	Join timer setting.
Leave	Leave timer setting.
Leaveall	Leavall timer setting.

6.3.6.3 set gvrp

Use this command to enable or disable GVRP globally on the device or on one or more ports.

set gvrp {enable | disable} [*port-string*]

Syntax Description

disable | enable	Disables or enables GVRP on the device.
port-string	(Optional) Disables or enables GVRP on specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, GVRP will be disabled or enabled for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to enable GVRP globally on the device:

```
Matrix(rw)->set gvrp enable
```

This example shows how to disable GVRP globally on the device:

```
Matrix(rw)->set gvrp disable
```

This example shows how to enable GVRP on Fast Ethernet port 3 in module 1:

```
Matrix(rw)->set gvrp enable fe.1.3
```

6.3.6.4 clear gvrp

Use this command to clear GVRP status or on one or more ports.

clear gvrp [*port-string*]

Syntax Description

port-string	(Optional) Clears GVRP status on specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, GVRP status will be cleared for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to clear GVRP status globally on the device:

```
Matrix(rw)->clear gvrp
```

6.3.6.5 set garp timer

Use this command to adjust the values of the join, leave, and leaveall timers.

set garp timer {[**join** *timer-value*] **[leave** *timer-value*] [**leaveall** *timer-value*]} *port-string*

NOTE: The setting of these timers is critical and should only be changed by personnel familiar with the 802.1Q standards documentation, which is not supplied with this device.

Syntax Description

join *timer-value*	Sets the GARP join timer in centiseconds (Refer to 802.1Q standard.)
leave *timer-value*	Sets the GARP leave timer in centiseconds (Refer to 802.1Q standard.)
leaveall *timer-value*	Sets the GARP leaveall timer in centiseconds (Refer to 802.1Q standard.)
port-string	Specifies the port(s) on which to configure GARP timer settings. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set the GARP join timer value to 100 centiseconds for all ports:

```
Matrix(rw)->set garp timer join 100 *.*.*
```

This example shows how to set the leave timer value to 300 centiseconds for all ports:

```
Matrix(rw)->set garp timer leave 300 *.*.*
```

This example shows how to set the leaveall timer value to 20000 centiseconds for all ports:

```
Matrix(rw)->set garp timer leaveall 20000 *.*.*
```

6.3.6.6 clear garp timer

Use this command to reset GARP timers back to default values.

clear garp timer {[**join**] **[leave**] [**leaveall**]} *port-string*

Syntax Description

join	(Optional) Resets the join timer to 20 centiseconds.
leave	(Optional) Resets the leave timer to 60 centiseconds.
leaveall	(Optional) Resets the leaveall timer to 1000 centiseconds.
port-string	Specifies the port(s) on which to reset GARP timer(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

At least one optional parameter must be entered.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the GARP leave timer to 60 centiseconds on Fast Ethernet port 5 in module 2:

```
Matrix(rw)->clear garp timer leave fe.2.5
```

7

Policy Classification Configuration

This chapter describes the Policy Classification set of commands and how to use them.

NOTE: It is recommended that you use Enterasys Networks NetSight Atlas Policy Manager as an alternative to CLI for configuring policy classification on the Matrix Series devices.

7.1 POLICY CLASSIFICATION CONFIGURATION SUMMARY

Matrix Series devices support policy profile-based provisioning of network resources by allowing IT administrators to:

- Create, change or remove user profiles based on business-specific use of network services.
- Permit or deny access to specific services by creating and assigning classification rules which map user profiles to protocol-based frame filtering policies configured for a particular VLAN or Class of Service (CoS).
- Assign or unassign ports to policy profiles so that only ports activated for a profile will be allowed to transmit frames accordingly.
- Configure CoS to automatically assign policy-based inbound rate limiters and transmit queues.

NOTE: Matrix Series devices also support policy-based routing, which forwards or drops packets at Layer 3 according to matching access lists (ACLs) in route maps configured on routing interfaces. For details, refer to Section 13.3.13.

7.2 PROCESS OVERVIEW: POLICY CLASSIFICATION CONFIGURATION

Use the following steps as a guide to configure policy classification on the device:

1. Configuring policy profiles (Section 7.3.1)
2. Assigning classification rules to policy profiles (Section 7.3.2)
3. Configuring policy-based Class of Service (CoS) (Section 7.3.3)

7.3 POLICY CLASSIFICATION CONFIGURATION COMMAND SET

7.3.1 Configuring Policy Profiles

Purpose

To review, create, change and remove policy profiles for managing network resources.

Commands

The commands used to review and configure policy profiles are listed below and described in the associated section as shown.

- show policy profile (Section 7.3.1.1)
- set policy profile (Section 7.3.1.2)
- clear policy profile (Section 7.3.1.3)
- show policy invalid (Section 7.3.1.4)
- set policy invalid action (Section 7.3.1.5)
- clear policy invalid action (Section 7.3.1.6)

7.3.1.1 show policy profile

Use this command to display policy profile information.

show policy profile {**all** | *profile-index* [*consecutive-pids*] [**-verbose**]}

Syntax Description

all | *profile-index*	Displays policy information for all profile indexes or a specific profile index.
consecutive-pids	(Optional) Displays information for specified consecutive profile indexes.
-verbose	(Optional) Displays detailed information.

Command Defaults

If optional parameters are not specified, summary information will be displayed for the specified index or all indexes.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display policy information for policy profile 11:

```
Matrix(rw)->show policy profile 11
Profile Index           :11
Profile Name            :MacAuth1
Row Status              :active
Port VID Status         :enabled
Port VID Override       :11
CoS Status              :disabled
CoS                     :0
Tagged Egress VLAN List :11
Forbidden VLAN List     :none
Untagged VLAN List      :none

Admin Profile Usage     :none
Oper Profile Usage      :fe.2.1-2
Dynamic Profile Usage   :fe.2.1-2
```

Table 7-1 provides an explanation of the command output.

Table 7-1 show policy profile Output Details

Output	What It Displays...
Profile Index	Number of the prolicy profile.
Profile Name	User-supplied name assigned to this policy profile.
Row Status	Whether or not the policy profile is enabled (**active**) or disabled.
Port VID Status	Whether or not PVID override is **enabled** or **disabled** for this policy profile. If all the classification rules associated with this profile are missed, then this parameter, if specified, determines default behavior.
Port VID Override	The PVID to assign to packets, if PVID override is enabled.
CoS Status	Whether or not Class of Service override is **enabled** or **disabled** for this profile. If all the classification rules associated with this profile are missed, then this parameter, if specified, determines default behavior.
CoS	The CoS priority value to assign to packets, if CoS override is enabled.
Tagged Egress VLAN List	VLAN(s) that ports to which the policy profile is assigned can use for tagged egress.
Forbidden VLAN List	VLAN(s) forbidden to ports to which the policy profile is assigned.
Untagged VLAN List	VLAN(s) that ports to which the policy profile is assigned can use for untagged egress.
Admin Profile Usage	Ports administratively assigned to use this policy profile.
Oper Profile Usage	Ports currently assigned to use this policy profile.
Dynamic Profile Usage	Port dynamically assigned to use this policy profile.

7.3.1.2 set policy profile

Use this command to create a policy profile entry.

set policy profile *profile-index* [**name** *name*] [**pvid-status** {**enable** | **disable**}] [**pvid** *pvid*] [**cos-status** {**enable** | **disable**}] [**cos** *cos*] [**egress-vlans** *egress-vlans*] [**forbidden-vlans** *forbidden-vlans*] [**untagged-vlans** *untagged-vlans*] [**append**] [**clear**]

Syntax Description

profile-index	Specifies an index number for the policy profile. Valid values are **1 - 1023**.
name *name*	(Optional) Specifies a name for the policy profile. This is a string from 1 to 64 characters.
pvid-status enable | **disable**	(Optional) Enables or disables PVID override for this policy profile. If all the classification rules associated with this profile are missed, then this parameter, if specified, determines default behavior.
pvid *pvid*	(Optional) Specifies the PVID to assign to packets, if PVID override is enabled and invoked as the default behavior.
cos-status enable | **disable**	(Optional) Enables or disables Class of Service override for this policy profile. If all the classification rules associated with this profile are missed, then this parameter, if specified, determines default behavior.
cos *cos*	(Optional) Specifies a COS value to assign to packets, if CoS override is enabled and invoked as the default behavior. Valid values are 0 to 255.
egress-vlans *egress-vlans*	(Optional) Specifies that the port to which this policy profile is applied should be added to the egress list of the VLANs defined by *egress-vlans*. Packets will be formatted as tagged.
forbidden-vlans *forbidden-vlans*	(Optional) Specifies that the port to which this policy profile is applied should be added as forbidden to the egress list of the VLANs defined by *forbidden-vlans*. Packets from this port will not be allowed to participate in the listed VLANs.

untagged-vlans *untagged-vlans*	(Optional) Specifies that the port to which this policy profile is applied should be added to the egress list of the VLANs defined by *untagged-vlans*. Packets will be formatted as untagged.
append	(Optional) Appends this policy profile setting to settings previously specified for this policy profile by the **egress-vlans**, **forbidden-vlans**, or **untagged-vlans** parameters. If **append** is not used, previous VLAN settings are replaced.
clear	(Optional) Clears this policy profile setting from settings previously specified for this policy profile by the **egress-vlans**, **forbidden-vlans**, or **untagged-vlans** parameters.

Command Defaults

If optional parameters are not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create a policy profile 1 named "netadmin" with PVID override enabled for PVID 10, and Class-of-Service override enabled for CoS 5. This profile can use VLAN 10 for untagged egress:

```
Matrix(rw)->set policy profile 1 name netadmin pvid-status enable pvid 10
  cos-status enable cos 5 untagged-vlans 10
```

7.3.1.3 clear policy profile

Use this command to delete a policy profile entry.

clear policy profile *profile-index*

Syntax Description

profile-index	Specifies the index number of the policy profile entry to be deleted. Valid values are **1** to **1023**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete policy profile 8:

```
Matrix(rw)->clear policy profile 8
```

7.3.1.4 show policy invalid

Displays information about the action the device will apply on an invalid or unknown policy.

show policy invalid {**action | count | all**}

Syntax Description

action | **count** | **all**	Shows the action the device should take if asked to apply an invalid or unknown policy, or the number of times the device has detected an invalid/unknown policy, or both action and count information.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display invalid policy action and count information:

```
Matrix(rw)->show policy invalid all
Current action on invalid/unknown profile is: Forward packets
Number of invalid/unknown profiles detected: 4
```

7.3.1.5 set policy invalid action

Use this command to assign the action the device will apply to an invalid or unknown policy.

set policy invalid action {**default-policy** | **drop** | **forward**}

Syntax Description

default-policy	Instructs the device to ignore this result and search for the next policy assignment rule.
drop	Instructs the device to block traffic.
forward	Instructs the device to forward traffic as if no policy has been assigned.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to assign a drop action to invalid policies:

```
Matrix(rw)->set policy invalid action drop
```

7.3.1.6 clear policy invalid action

Use this command to reset the action the device will apply to an invalid or unknown policy to the default action of applying the default policy.

clear policy invalid action

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the invalid policy action:

```
Matrix(rw)->clear policy invalid action
```

7.3.2 Assigning Classification Rules to Policy Profiles

Purpose

To review, assign and unassign classification and admin rules. Classification rules map policy profiles to protocol-based frame filtering policies configured for a particular VLAN or Class of Service (CoS). Admin rules assign policy profiles to incoming traffic.

Commands

The commands used to review, assign and unassign classification rules to policy profiles and ports are listed below and described in the associated section as shown.

- show policy rule (Section 7.3.2.1)
- show policy capability (Section 7.3.2.2)
- set policy classify
- set policy rule (Section 7.3.2.4)
- clear policy rule (Section 7.3.2.5)
- clear policy all-rules (Section 7.3.2.6)
- set policy port (Section 7.3.2.7)
- show policy allowed-type (Section 7.3.2.8)
- set policy allowed-type (Section 7.3.2.9)
- clear policy allowed-type (Section 7.3.2.10)
- clear policy port-hit (Section 7.3.2.11)

7.3.2.1 show policy rule

Use this command to display policy classification and admin rule information.

show policy rule [**attribute**] | [**all**] | [**admin-profile**] | [*profile-index*] [**ether** | **ipdest** | **ipfrag** | **ipproto** | **ipsource** | **iptos** | **llcDsapSsap** | **macdest** | **macsource** | **port** | **tcpdestport**| **tcpsourceport**| **udpdestport** | **udpsourceport** [*data*] [**mask** *mask*] [**port-string** *port-string*] [**rule-status** {**active** | **not-in-service** | **not-ready**}] [**storage-type** {**non-volatile** | **volatile**}] [**vlan** *vlan*] | [**drop** | **forward**] [**dynamic-pid** *dynamic-pid*] [**cos** *cos*] [**admin-pid** *admin-pid*] [**-verbose**]

Syntax Description

attribute	Displays the attributes of the specified rules.
all | **admin-profile** | *profile-index*	Displays **all** admin and classification rules, rules for the admin profile, or for a specific *profile-index* number. Valid index values are **1 - 1023**.
ether	Displays Ethernet type II rules.
ipdest	Displays IP destination address rules.
ipfrag	Displays IP fragmentation rules.
ipproto	Displays IP protocol field in IP packet rules.
ipsource	Displays IP source address rules.
iptos	Displays Type of Service rules.
llcDsapSsap	Displays 802.3 DSAP/SSAP rules.
macdest	Displays MAC destination address rules.
macsource	Displays MAC source address rules.
port	Displays port related rules.
tcpdestport	Displays TCP destination port rules.
tcpsourceport	Displays TCP source port rules.
udpdestport	Displays UDP destination port rules.
udpsourceport	Displays UDP source port rules.

data	(Not required for **ipfrag** classification.) Displays rules for a predefined classifier. This value is dependent on the classification type entered. Refer to Table 7-3 for valid values for each classification type.
mask *mask*	(Optional) Displays rules for a specific data mask. Refer to Table 7-3 for valid values for each classification type and data value.
port-string *port-string*	(Optional) Displays rules related to a specific ingress port.
rule-status active | **not-in-service** | **not-ready**	(Optional) Displays rules related to a specific rules status.
storage-type non-volatile | **volatile**	(Optional) Displays rules configured for either non-volatile or volatile storage.
vlan *vlan*	(Optional) Displays rules for a specific VLAN ID.
drop | **forward**	Displays rules based on whether matching packets specified by the **vlan** parameter will be dropped or forwarded.
dynamic-pid *dynamic-pid*	Displays rules associated with a specific dynamic policy profile index ID.
cos *cos*	(Optional) Displays rules for a Class-of-Service value.
admin-pid *admin-pid*	Displays rules associated with a specific administrative policy profile index ID.
-verbose	(Optional) Displays detailed information.

Command Defaults

- If *port-string*, rule status, storage type, Syslog state, trap, and usage-list are not specified, all rules related to other specifications will be displayed.
- If **verbose** is not specified, summary information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display policy classification information for Ethernet type 2 rules:

```
 Matrix(rw)->show policy rule ether
|PID  |Rule Type    |Rule Data           |Mk|PortStr   |RS|ST|S|T|D|VLAN|CoS |U|
| 1   |Ether        |32923 (0x809B)      |16|All       | A|NV|Y|Y| | 105|    |?|
| 1   |Ether        |33011 (0x80F3)      |16|All       | A|NV|Y|Y| | 105|    |?|
| 1   |Ether        |33079 (0x8137)      |16|All       | A|NV|Y|Y| | 101|    |?|
| 1   |Ether        |33080 (0x8138)      |16|All       | A|NV|Y|Y| | 101|    |?|
| 1   |Ether        |33276 (0x81FC)      |16|All       | A|NV|Y|Y| |drop|    |?|
| 2   |Ether        |32923 (0x809B)      |16|All       | A|NV|Y|Y| | 105|    |?|
| 2   |Ether        |33011 (0x80F3)      |16|All       | A|NV|Y|Y| | 105|    |?|
| 2   |Ether        |33079 (0x8137)      |16|All       | A|NV|Y|Y| | 101|    |?|
```

This example shows how to display admin rule information for the policy profile with index number 1:

```
 Matrix(rw)->show policy rule admin-pid 1
|Admin|Rule Type   |Rule Data           |Mk|PortStr   |RS|ST|S|T|D|dPID|aPID|U|
|admin|Port        |fe.1.1              |16|fe.1.1    | A|NV| | | |    |   1|?|
|admin|Port        |fe.1.2              |16|fe.1.2    | A|NV| | | |    |   1|?|
|admin|Port        |fe.1.3              |16|fe.1.3    | A|NV| | | |    |   1|?|
|admin|Port        |fe.1.4              |16|fe.1.4    | A|NV| | | |    |   1|?|
|admin|Port        |fe.1.5              |16|fe.1.5    | A|NV| | | |    |   1|?|
|admin|Port        |fe.1.6              |16|fe.1.6    | A|NV| | | |    |   1|?|
```

Table 7-2 provides an explanation of the command output.

Table 7-2 show policy rule Output Details

Output	What It Displays...
PID	Profile profile index number, indicating a classification rule is displayed. Assigned to this classification rule with the **set policy profile** command (Section 7.3.1.2).
Admin	Indicates an admin rule is displayed.
Rule Type	Whether the rule protocol-based or port-based. Refer to Table 7-3 for valid classification types.
Rule Data	Rule data value. Refer to Table 7-3 for valid values for each classification type.
Mk	Rule data mask. Refer to Table 7-3 for valid values for each classification data value.

Table 7-2 show policy rule Output Details (Continued)

Output	What It Displays...
PortStr	Ingress port(s) to which this rule applies.
RS	Whether or not the status of this rule is active (A), not in service or not ready.
ST	Whether or not this rule's storage type is non-volatile (NV) or volatile (V).
Vlan	VLAN ID to which this rule applies and whether or not matching packets will be dropped or forwarded.
CoS	Class of Service value to which this rule applies.
dPID	Whether or not this is a dynamic profile ID.
aPID	Whether or not this is an administrative profile index ID.

7.3.2.2 show policy capability

Use this command to display all policy classification capabilities supported by your Matrix Series device. The output of this command shows a table listing classifiable traffic attributes and the type of actions, by rule type, that can be executed relative to each attribute. Above the table is a list of all the actions possible on this device.

The left-most column of the table lists all possible classifiable traffic attributes. The next two columns from the left indicate how policy profiles may be assigned, either administratively or dynamically. The next four columns from the left indicate the actions that may be performed. The last three columns indicate auditing options.

An x in an action column for a traffic attribute row indicates that your system has the capability to perform that action for traffic classified by that attribute.

show policy capability

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display your Matrix Series device's policy classification capabilities. In this case, Matrix DFE-Platinum Series capabilities are shown. Refer to Section 7.3.2.4 for a description of the parameters displayed:

```
Matrix(rw)->show policy capability
The following supports related to policy are supported in this device:
VLAN Forwarding          Priority                 Permit
Deny                     TCI Overwrite            Rule-Use Notification
Rules Table              Rule-Use Accounting
Longest Prefix Rules     Port Disable Action
 ============================================================
|                          | D |   |   |   |   | F |   |   | D |
|                          | Y |   |   |   |   | O | S |   | I |
|                          | N | A |   |   |   | R | Y |   | S |
|                          | A | D | V |   | D | W | S | T | A |
|                          | M | M | L | C | R | A | L | R | B |
|                          | I | I | A | O | O | R | O | A | L |
| SUPPORTED RULE TYPES     | C | N | N | S | P | D | G | P | E |
 ============================================================
|MAC source address        | X | X | X | X | X | X | X | X | X |
|MAC destination address   | X | X | X | X | X | X | X | X | X |
|IPX source address        | X | X | X | X | X | X | X | X | X |
|IPX destination address   | X | X | X | X | X | X | X | X | X |
|IPX source socket         | X | X | X | X | X | X | X | X | X |
|IPX destination socket    | X | X | X | X | X | X | X | X | X |
|IPX transmission control  | X | X | X | X | X | X | X | X | X |
|IPX type field            | X | X | X | X | X | X | X | X | X |
|IPv6 source address       |   |   |   |   |   |   |   |   |   |
|IPv6 destination address  |   |   |   |   |   |   |   |   |   |
|IPv6 flow label           |   |   |   |   |   |   |   |   |   |
|IP source address         | X | X | X | X | X | X | X | X | X |
|IP destination address    | X | X | X | X | X | X | X | X | X |
|IP fragmentation          | X | X | X | X | X | X | X | X | X |
|UDP port source           | X | X | X | X | X | X | X | X | X |
|UDP port destination      | X | X | X | X | X | X | X | X | X |
|TCP port source           | X | X | X | X | X | X | X | X | X |
|TCP port destination      | X | X | X | X | X | X | X | X | X |
|ICMP packet type          | X | X | X | X | X | X | X | X | X |
|TTL                       |   |   |   |   |   |   |   |   |   |
|IP type of service        | X | X | X | X | X | X | X | X | X |
|IP proto                  | X | X | X | X | X | X | X | X | X |
|Ether II packet type      | X | X | X | X | X | X | X | X | X |
|LLC DSAP/SSAP/CTRL        | X | X | X | X | X | X | X | X | X |
|VLAN tag                  | X | X | X | X | X | X | X | X | X |
|Replace tci               | X | X | X | X | X | X | X | X | X |
|Port string               | X | X | X | X | X | X | X | X | X |
 ============================================================
```

7.3.2.3 set policy classify

Use this command to assign incoming untagged frames to a specific policy profile, classification and to VLAN or Class-of-Service classification rules.

set policy classify *profile-index classify-index* {**vlan** | **cos**} {*classify-value* | **forward** | **drop**} {**ether** | **llc** | **iptos** | **ipproto** | **ipxclass** | **ipxtype** | **ipsource** | **ipdest** | **ipxsource** | **ipxdest** | **udpportsource** | **udpportdest** | **tcpportsource** | **tcpportdest** | **ipxsourcesocket** | **ipxdestsocket** | **macsource** | **macdest** | **ipfrag** | **icmptype** | **vlantag** | **tci** | **port**} [*class-data-val*] [*class-data-mask*]

NOTE: Classification rules are automatically enabled when created.

Syntax Description

profile-index	Specifies that this is an administrative rule or associates this classification rule with a policy profile index configured with the **set policy profile** command (Section 7.3.1.2). Valid *profile-index* values are **1- 63**.
classify-index	Policy Classification Index (1-65535)
vlan	Specifies Vlan Classification Rule
cos	Specifies Class Of Service Classification Rule
classify-value	vlan / Class Of Service (0-4095)
forward	Specifies Forwarding of packet
drop	Specifies Dropping of packet
ether	Classifies based on type field in Ethernet II packet.
llc	DSAP/SSAP pair in 802.3 type packet field - (0 - 65535)
iptos	Classifies based on Type of Service field in IP packet.
ipproto	Classifies based on protocol field in IP packet.
ipsource	Classifies based on source IP address
ipdest	Classifies based on destination IP address
udpportsource	UDP port source - (0 - 65535)
udpportdest	UDP port destination - (0 - 65535)

tcpportsource	TCP port source - (0 - 65535)
tcpportdest	TCP port destination - (0 - 65535)
macsource	Classifies based on MAC source address.
macdest	Classifies based on MAC destination address.
ipfrag	Classifies based on IP fragmentation value.
port	Classifies based on port-string.
class-data-val	Data Value of meaning
class-data-mask	Number of mask bits to apply to Data Value

Command Defaults

- If *mask* is not specified, all data bits will be considered relevant.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to use Table 7-3 to create (and enable) a VLAN classification rule to policy 2, classification 65, to drop packets from a source IP address of 172.16.1.2:

```
Matrix(rw)->set policy classify 2 65 vlan drop ipsource 172.16.1.2
```

7.3.2.4 set policy rule

Use this command to assign incoming untagged frames to a specific policy profile and to VLAN or Class-of-Service classification rules.

set policy rule admin-profile | *profile-index* {**ether** |**ipfrag** | **ipproto** | **ipdest** | **ipsource** | **iptos** | **llcDsapSsap** | **macdest** | **macsource** | | **port** | **tcpdestport** | **tcpsourceport** | **udpdestport** | **udpsourceport**} *data* [**mask** *mask*] [**port-string** *port-string*] [**storage-type** {**non-volatile** | **volatile**}] [**vlan** *vlan*] | [**drop** | **forward**] [**admin-pid** *admin-pid*] [**cos** *cos*]

NOTE: Classification rules are automatically enabled when created.

Syntax Description

admin-profile | *profile-index*	Specifies that this is an administrative rule or associates this classification rule with a policy profile index configured with the **set policy profile** command (Section 7.3.1.2). Valid *profile-index* values are **1- 1023**. **NOTE:** Admin profiles can be assigned to a specific ingress port by specifying **port-string** and **admin-pid** values as described below.
ether	Classifies based on type field in Ethernet II packet.
ipdest	Classifies based on destination IP address.
ipfrag	Classifies based on IP fragmentation value.
ipproto	Classifies based on protocol field in IP packet.
ipsource	Classifies based on source IP address.
iptos	Classifies based on Type of Service field in IP packet.
llcDsapSsap	Classifies based on DSAP/SSAP pair in 802.3 type packet.
macdest	Classifies based on MAC destination address.
macsource	Classifies based on MAC source address.
port	Classifies based on port-string.
tcpdestport	Classifies based on TCP destination port with.

tcpsourceport	Classifies based on TCP source port .
udpdestport	Classifies based on UDP destination port .
udpsourceport	Classifies based on UDP source port .
data	(Not required for **ipfrag** classification.) Specifies the code for a predefined classifier. This value is dependent on the classification type entered. Refer to Table 7-3 for valid values for each classification type.
mask *mask*	(Optional) Specifies the number of significant bits to match, dependent on the *data* value entered. Refer to Table 7-3 for valid values for each classification type and data value.
port-string *port-string*	(Optional) If **admin-profile** is specified, applies this administratively-assigned rule to a specific ingress port. **NOTE:** Matrix Series devices with firmware versions 3.00.xx and higher also support this alternative command to administratively assign a profile rule to a port: **set policy port** *port-string admin-id*
storage-type non-volatile | **volatile**	Adds or removes this entry from non-volatile storage.
vlan *vlan*	Classifies to a VLAN ID.
drop | **forward**	Specifies that packets within this classification will be dropped or forwarded.
admin-pid *admin-pid*	If **admin-profile** is specified, associates this rule with a policy profile index ID. Valid values are **1** - **1023**.
cos *cos*	Specifies that this rule will classify to a Class-of-Service ID. Valid values are **0** - **255**, and can be configured using the **set cos settings** command as described in Section 7.3.3.21. A value of -1 indicates that no CoS forwarding behavior modification is desired.

Command Defaults

- If *mask* is not specified, all data bits will be considered relevant.

- If *port-string* is not specified, rule will be scoped to all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to use Table 7-3 to create (and enable) a classification rule to associate with policy number 1. This rule will filter Ethernet II Type 1526 frames to VLAN 7:

```
Matrix(rw)->set policy rule 1 ether 1526 vlan 7
```

This example shows how to use Table 7-3 to create (and enable) a classification rule to associate with policy profile number 5. This rule specifies that UDP frames from source port 45 will be filtered to VLAN 7:

```
Matrix(rw)->set policy rule 5 udpportsource 45 vlan 7
```

This example shows how to configure classification rule 2 as an administrative profile and assign it to ingress port fe.1.1:

```
Matrix(rw)->set policy rule admin-profile port fe.1.1 port-string fe.1.1
admin-pid 2
```

Table 7-3 provides the **set policy rule** *data* values that can be entered for a particular classification type, and the *mask* bits that can be entered for each classifier associated with that parameter.

Table 7-3 Valid Values for Policy Classification Rules

Classification Rule Parameter	*data* value	*mask* bits
ether	Type field in Ethernet II packet: **1536 - 65535**	**1- 16**
Destination or Source IP Address: **ipdest** **ipsource**	IP Address in dotted decimal format: **000.000.000.000**	**1 - 48**

Table 7-3 Valid Values for Policy Classification Rules (Continued)

Classification Rule Parameter	*data* value	*mask* bits
ipfrag	Not applicable.	Not applicable.
ipproto	Protocol field in IP packet: **0 - 255**	**1- 8**
iptos	Type of Service field in IP packet: **0 - 255**	**1- 8**
llcDsapSsap	DSAP/SSAP/CTRL field in llc: **a-b-c-ab**	**1 - 40**
Destination or Source MAC: **macdest** **macsource**	MAC Address: **00-00-00-00-00-00**	**1 - 48**
port	Port string: Eg. **fe.1.1**	**1 - 16**
Destination or Source TCP port: **tcpdestport** **tcpsourceport**	TCP Port Number : **ab 0-65535:1.1.1.1;** or **0-0xFFFF:1.1.1.1**	**1 - 48**
Destination or Source UDP port: **udpsourceport** **udpdestport**	UDP Port Number : **ab 0-65535:1.1.1.1;** or **0-0xFFFF:1.1.1.1**	**1 - 48**

7.3.2.5 clear policy rule

Use this command to delete one or all policy classification rule entries.

clear policy rule admin-profile | *profile-index* **all-pid-entries** | **ether ipdest** | **ipfrag** | **ipproto** | **ipsource**| **iptos** |**llcDsapSsap** | **macdest** | **macsource** | **port** |**tcpdestport**| **tcpsourceport**| **udpdestport**| **udpsourceport**] [**all-traffic-entries |** *data*][**mask** *mask*] [**port-string** *port-string*]}

Syntax Description

admin-profile | *profile-index*	Deletes an administrative profile rule, or deletes rule(s) associated with a specific profile number. Valid *profile-index* values are **1 - 1023**.
all-pid-entries	Deletes all rules associated with the specified policy profile index ID.
ether	Deletes associated Ethernet II classification rule.
ipdest	Deletes associated IP destination classification rule.
ipfrag	Deletes associated IP fragmentation classification rule.
ipproto	Deletes associated IP protocol classification rule.
ipsource	Deletes associated IP source classification rule.
iptos	Deletes associated IP Type of Service classification rule.
llcDsapSsap	Deletes associated DSAP/SSAP classification rule.
macdest	Deletes associated MAC destination address classification rule.
macsource	Deletes associated MAC source address classification rule.
port	Deletes associated port-string classification rule.
tcpdestport	Deletes associated TCP destination port classification rule .
tcpsourceport	Deletes associated TCP source port classification rule .
udpdestport	Deletes associated UDP destination port classification rule .
udpsourceport	Deletes associated UDP source port classification rule .

all-traffic-entries | *data*	(Optional) Deletes all entries associated with this traffic rule or a specific data value entry. Refer to Table 7-3 for valid values for each classification type.
mask *mask*	(Optional) Deletes associated data mask. Refer to Table 7-3 for valid values for each classification type and data value.
port-string *port-string*	(Optional) Deletes specified rule entries for specific ingress port(s).

Command Defaults

When applicable, *data*, *mask*, and *port-string* must be specified for individual rules to be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete all classification rule entries associated with policy profile 1 from all ports:

```
Matrix(rw)->clear policy rule 1 all-pid-entries
```

7.3.2.6 clear policy all-rules

Use this command to remove all admin and classification rules.

clear policy all-rules

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove all administrative and classification rules:

```
Matrix(rw)->clear policy all-rules
```

7.3.2.7 set policy port

Use this command to assign an administrative rule to a port.

NOTE: The **set policy rule** command (Section 7.3.2.4) used with the **admin-profile** parameter will associate a classification rule with a policy profile index number, thus making an administrative rule.

set policy port *port-name admin-id*

Syntax Description

port-name	Specifies the port(s) on which to set assign an administrative rule. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
admin-id	Specify a policy profile index number with a valid range of [1..63].

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to assign an administrative rule with an index of 20 to port fe.1.3:

```
Matrix(rw)->set policy port fe.1.3 20
```

7.3.2.8 show policy allowed-type

Use this command to display a list of currently supported traffic rules applied to the admininstrative profile for one or more ports.

show policy allowed-type *port-string* [**-verbose**]

Syntax Description

port-string	Specifies port(s) for which to display traffic rules.
-verbose	(Optional) Displays detailed information.

Command Defaults

If **-verbose** is not specified, summary information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to show information about policies allowed on port ge.1.5:

```
Matrix(rw)->show policy allowed-type ge.1.5
SUPPORTED AND ALLOWED TRAFFIC RULE TYPES

 o Means Traffic Rule Type is supported on this bridge port
 * Means Traffic Rule Type is supported and allowed on this bridge port

=========================================================================
|               |   TRAFFIC  RULE  TYPES                                |
+---------------+---+-----------+-----+-----+---+---+-+-----+---+---+-+
|               |   |           |     |     |   |   | |     |   |   | |
|               |MAC|   IPX     |IPv6 | IP  |UDP|TCP| | IP  |   |   | |
|               |   |           |     |     |   |   | |     |   |   | |
|               |   |    S D    |     |     |   |   | |     |E  |   | |
|               |   |    S S   T|    F|    F|   |   |I|    T|N  |V  |P|
|               |S D|S D O O C Y|S D L|S D R|S D|S D|C|T T Y|E L|L T|O|
|               |R S|R S C C O P|R S O|C S A|R S|R S|M|T O P|T L|A C|R|
|               |C T|C T K K S E|C T W|R T G|C T|C T|P|L S E|2 C|N I|T|
|               |---+-----------+-----+-----+---+---+-+-----+---+---+-+
|               |   |           |  1 1|1 1 1|1 1|1 1|1|2 2 2|2 2|2 2|3|
|     Port      |1 2|3 4 5 6 7 8|9 0 1|2 3 4|5 6|7 8|9|0 1 2|5 6|7 8|1|
=========================================================================
| ge.1.5 |* *|* * * * * *|     |* * *|* *|* *|*|  * *|* *|* *|* *|*|
```

7.3.2.9 set policy allowed-type

Use this command to assign a list of traffic rules that can be applied to the admin profile for one or more ports.

set policy allowed-type *port-string* **traffic-rule** *rule-list* [**append** | **clear**]

Syntax Description

port-string	Specifies port(s) on which to apply traffic rules.
traffic-rule *rule-list*	Specifies traffic rules to be allowed. This is a numeric value displayed in the **show policy allowed-type** output (Section 7.3.2.8). Entering "none" means that no traffic rules will be allowed on this port.
append | **clear**	(Optional) Appends traffic rule(s) to the port(s) current rules, or clears specified rules.

Command Defaults

If **append** or **clear** is not specified, rule(s) will be appended to the port's current list.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to allow only rule type 1 (source MAC address classification) to be applied to the admin profile for port ge.1.5:

```
Matrix(rw)->set policy allowed-type ge.1.5 traffic-rule 1
```

This example shows how to clear only rule type 27 (VLAN classification) from the allowed rule type list on port ge.1.5. Any other allowed rule types on the port will still remain assigned to that port:

```
Matrix(rw)->set policy allowed-type ge.1.5 traffic-rule 27 clear
```

7.3.2.10 clear policy allowed-type

Use this command to clear the list of traffic rules currently assigned to the admin profile for one or more ports. This will reassign the default setting, which is all rules are allowed.

clear policy allowed-type *port-string*

Syntax Description

port-string	Specifies port(s) on which to clear traffic rules.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the allowed rule list from port ge.1.5:

```
Matrix(rw)->clear policy allowed-type ge.1.5
```

7.3.2.11 clear policy port-hit

Use this command to clear rule port hit indications on one or more ports.

clear policy port-hit {**all** | **port-list** *port-list*}

Syntax Description

all | **port-list** *port-list*	Clears port hit indications on all ports or on one or more specified ports.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear rule port hit indications on all ports:

```
Matrix(rw)->clear policy port-hit all
```

7.3.3 Configuring Policy Class of Service (CoS)

Using Port-Based or Policy-Based CoS Settings

NOTE: It is recommended that you use Enterasys Networks NetSight Atlas Policy Manager as an alternative to CLI for configuring policy-based CoS on the Matrix Series devices.

The Matrix Series device supports Class of Service (CoS), which allows you to assign mission-critical data to higher priority through the device by delaying less critical traffic during periods of congestion. The higher priority traffic through the device is serviced first before lower priority traffic. The Class of Service capability of the device is implemented by a priority queueing mechanism. Class of Service is based on the IEEE 802.1D (802.1p) standard specification, and allows you to define eight priorities (0-7, with 7 granted highest priority) and, depending on port type, up to 16 transmit queues (0-15) of traffic for each port.

Enterasys Networks' enhanced CoS implementation allows you to use the following methods to configure Class of Service on the Matrix Series device:

- Allowing the device to automatically assign policy-based inbound rate limiters and transmit queues as described in this section.
- Configuring transmit queueing and rate limiting on a per-port basis as described in Chapter 8.

By defult, policy-based CoS is disabled on the device, and default or user-assigned port-based 802.1D (802.1p) settings are used to determine transmit queues and traffic rate limiting. When policy-based CoS is enabled, the default and user-assigned settings will override port-based settings described in Chapter 8.

About Policy-Based CoS Default and User-Defined Configurations

Once enabled using the **set cos state** command as described in Section 7.3.3.2, the policy-based CoS function provides the following default configuration:

- Transmit queues (TXQ)-- A strict-priority queueing mechanism which gives higher priority queues absolute preferential treatment over low priority queues. This ensures the transmit port does not serve a transmit queue unless all higher priority queues are empty. As described previously in this section, eight priority designations and, depending on port type, up to 16 four transmit queues are defined for each port.
- Inbound rate limiting (IRL) -- No inbound rate limiters are configured.

You can add to these default configurations by defining new port groupings, and assigning inbound rate limiters or transmit queues and priorities. Whether you are specifying IRL or TXQ parameters, the process for user-defined CoS configuration involves the following steps and associated commands listed in Table 7-4.

CoS CLI Displays on Matrix DFE-Gold or NSA Systems

Some of the CLI output in this section shows examples of CoS configurations on a Matrix DFE-Platinum chassis-based system. If you are using a Matrix DFE-Gold or Matrix NSA standalone system, port designations and other output may be different.

Table 7-4 Configuring User-Defined CoS

To do this....	Use these commands...
1. Enable CoS.	**set cos state**
2. If desired, create new or change existing CoS port configurations.	**set cos port-config irl** **set cos port config txq**
3. Define IRL or TXQ resources (data rates or transmit priorities).	**set cos port-resource irl** **set cos port-resource txq**
4. Bind a CoS reference index ID to a defined resource.	**set cos reference irl** **set cos reference txq**
5. Bind an IRL or TXQ reference ID to a CoS setting index ID.	**set cos setting**
6. Associate CoS index IDs to policy rules.	**set policy rule**

Purpose

To configure policy-based Class of Service.

Commands

The commands used to configure policy-based Class of Service are listed below and described in the associated section as shown.

- show cos state (Section 7.3.3.1)
- set cos state (Section 7.3.3.2)
- show cos port-type (Section 7.3.3.3)

- show cos unit (Section 7.3.3.4)
- show cos port-config (Section 7.3.3.5)
- set cos port-config irl (Section 7.3.3.6)
- clear cos port-config irl (Section 7.3.3.7)
- set cos port-config txq (Section 7.3.3.8)
- clear cos port-config txq (Section 7.3.3.9)
- show cos port-resource (Section 7.3.3.10)
- set cos port-resource irl (Section 7.3.3.11)
- clear cos port-resource irl (Section 7.3.3.12)
- set cos port-resource txq (Section 7.3.3.13)
- clear cos port-resource txq (Section 7.3.3.14)
- show cos reference (Section 7.3.3.15)
- set cos reference irl (Section 7.3.3.16)
- clear cos reference irl (Section 7.3.3.17)
- set cos reference txq (Section 7.3.3.18)
- clear cos reference txq (Section 7.3.3.19)
- show cos settings (Section 7.3.3.20)
- set cos settings (Section 7.3.3.21)
- clear cos settings (Section 7.3.3.22)
- show cos violation irl (Section 7.3.3.23)
- clear cos violation irl (Section 7.3.3.24)
- clear cos all-entries (Section 7.3.3.25)

7.3.3.1 show cos state

Use this command to display the Class of Service enable state.

show cos state

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to show the Class of Service enable state:

```
Matrix(rw)->show cos state
Class-of-Service application is enabled
```

7.3.3.2 set cos state

Use this command to enable or disable Class of Service.

set cos state{**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables Class of Servic.e

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable Class of Service:

```
Matrix(rw)->set cos state enable
```

7.3.3.3 show cos port-type

Use this command to display Class of Service port type configurations. The Matrix Series CoS implementation provides two default port type groupings for designating available rate limiting and transmit queue resources on device modules. Port type 0, which is available only on Matrix DFE-Platinum Series chassis-based modules, designates the DFE Platinum 7G4270-12 module. Port type 1 designates all other modules, including Gold DFE and NSA modules. Other port groupings can be configured using the commands in this section.

show cos port-type [**irl** | **txq**] [*index-list*]

Syntax Description

irl | **txq**	(Optional) Displays inbound rate limiting or transmit queue information.
index-list	(Optional) Displays information for a specific port type.

Command Defaults

If not specified, all rate limiting information for all port types will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display all Class of Service port type information. In this case, no new port groups have been configured, so information for the two device default groups of 0 and 1 are shown:

```
Matrix(rw)->show cos port-type
Number of resources:                Supported rate types:
 txq = transmit queue(s)             perc  = percentage
 irl = inbound rate limiter(s)       pps   = packets per second
 orl = outbound rate limiter(s)      Kbps  = kilobits per second
                                     Mbps  = megabits per second
                                     Gbps  = gigabits per second
                                     Tbps  = terabits per second

                     Number of
                     slices /
       Port type     Number of  Supported  Eligible           Unselected
Index  description   queues     rate type   ports              ports
-----  ------------  ---------  ---------  -----------------  --------------
0      DFE-P 16Q       64/16    perc       ge.1.1-12          ge.1.1-12
                                Kbps
                                Mbps
                                Gbps

1      DFE-P 4Q        32/4     perc       ge.2.1-30;         ge.2.1-30;
                                Kbps       ge.3.1-30;         ge.3.1-30;
                                Mbps       ge.4.1-30;         ge.4.1-30;
                                Gbps       fe.6.1-48;         fe.6.1-48;
                                           ge.6.1-6;          ge.6.1-6;
                                           fe.7.1-72          fe.7.1-72

       Port type     Number of  Supported  Eligible           Unselected
Index  description   limiters   rate type   ports              ports
-----  ------------  ---------  ---------  -----------------  --------------
0      DFE-P 32 IRL    32 irl   perc       ge.1.1-12          ge.1.1-12
                                Kbps
                                Mbps
                                Gbps

1      DFE-P 8 IRL      8 irl   perc       ge.2.1-30;         ge.2.1-30;
                                Kbps       ge.3.1-30;         ge.3.1-30;
                                Mbps       ge.4.1-30;         ge.4.1-30;
                                Gbps       fe.6.1-48;         fe.6.1-48;
                                           ge.6.1-6;          ge.6.1-6;
                                           fe.7.1-72          fe.7.1-72
```

Table 7-5 provides an explanation of the command output.

Table 7-5 show cos port-type Output Details

Output	What It Displays...
Index	Port type index. Port type 0 designates the Matrix Platinum Series 7G4270-12 module, and port type 1 designates all other modules.
Port type description	Resource-specific text description of the port type. Default names are: • DFE-P 16Q for port type 0 TXQ (Applies to DFE-Platinum chassis-based systems only) • DFE-P or DFE-G 4Q for port type 1 TXQ • DFE-P 32 IRL for port type 0 IRL (Applies to DFE-Platinum chassis-based systems only) • DFE-P or DFE-G 8 IRL for port type 1 IRL
Number of slices / Number of queues	The total number of slices of transmit resources that can be divided among port queues, and the total number of queues available. Default port type 0 (the Matrix Platinum Series 7G4270-12 module) allows 64 slices for 16 queues. Default port type 1 (all other modules) allows 32 slices for 4 queues.
Number of limiters	Maximum number of inbound rate limiters configurable for each port type. When configured for IRL, default port type 0 (the Matrix Platinum Series 7G4270-12 module) allows for 32, and default port type 1 (all other modules) allows for 8.
Supported rate types	Unit of measure supported by the port type.
Eligible ports	Which device ports meet this port type criteria.
Unselected ports	Which ports have not been assigned user-defined port configuration settings,

7.3.3.4 show cos unit

Use this command to display Class of Service units of measure information, including rate type, minimum and maximum limits of the port groups, and their respective granularity.

show cos unit [**irl** | **txq**] [**port-type** *index*]

Syntax Description

irl | **txq**	(Optional) Displays inbound rate limiting or transmit queue information.
port-type *index*	(Optional) Displays information for a specific port type.
	Displays the unit of measure as percentage of total bandwidth, or kilobits, megabits, or gigabits per second.

Command Defaults

If not specified, all rate limiting information for all port types and CoS units of measure will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to show all Class of Service IRL unit of measure information:

```
Matrix(rw)->show cos unit irl

Port Type  Type  Unit  Maximum Rate  Minimum Rate  Granularity
---------  ----  ----  ------------  ------------  -----------
0          irl   Gbps  10            1             1
0          irl   Mbps  10000         1             1
0          irl   Kbps  10000000      1024       1
0          irl   perc  100           1             1
1          irl   Gbps  10            1             1
1          irl   Mbps  10000         1             1
1          irl   Kbps  10000000      1024       1
1          irl   perc  100           1             1
```

7.3.3.5 show cos port-config

Use this command to display Class of Service port group configurations.

show cos port-config [**irl** | **txq**] [*group-type-index*]

Syntax Description

irl | **txq**	(Optional) Displays inbound rate limiting or transmit queue information.
group-type-index	(Optional) Displays information for a specific port group/type index. Valid entries are in the form of **group.type**. Group can be 0-7, with 0 designating the default group, and 1-7 reserved for user-defined groups. Default port type values cannot be changed, and are 0 for the Matrix DFE-Platinum 7G4270-12 module, and 1 for all other modules.

Command Defaults

If not specified, all rate limiting information for all port types will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to show all Class of Service port group configuration information:

```
Matrix(rw)->show cos port-config
* Percentage/queue (if any) are approximations based on
   [(slices/queue) / total number of slices]

Transmit Queue Port Configuration Entries
-------------------------------------------------------------------------
Port Group Name  :DFE-P 16Q
Port Group       :0
Port Type        :0
Assigned Ports   :ge.1.1-12
Arbiter Mode     :Strict
Slices/queue     :Q [ 0]:   0  Q [ 1]:   0  Q [ 2]:   0  Q [ 3]:   0
                 :Q [ 4]:   0  Q [ 5]:   0  Q [ 6]:   0  Q [ 7]:   0
                 :Q [ 8]:   0  Q [ 9]:   0  Q [10]:   0  Q [11]:   0
                 :Q [12]:   0  Q [13]:   0  Q [14]:   0  Q [15]:  64
Percentage/queue :Q [ 0]:   0% Q [ 1]:   0% Q [ 2]:   0% Q [ 3]:   0%
                 :Q [ 4]:   0% Q [ 5]:   0% Q [ 6]:   0% Q [ 7]:   0%
                 :Q [ 8]:   0% Q [ 9]:   0% Q [10]:   0% Q [11]:   0%
                 :Q [12]:   0% Q [13]:   0% Q [14]:   0% Q [15]: 100%
-------------------------------------------------------------------------
Port Group Name  :DFE-P 4Q
Port Group       :0
Port Type        :1
Assigned Ports   :ge.2.1-30;ge.3.1-30;ge.4.1-30;fe.6.1-48;ge.6.1-6;fe.7.1-72
Arbiter Mode     :Strict
Slices/queue     :Q [ 0]:   0  Q [ 1]:   0  Q [ 2]:   0  Q [ 3]:  32
Percentage/queue :Q [ 0]:   0% Q [ 1]:   0% Q [ 2]:   0% Q [ 3]: 100%
-------------------------------------------------------------------------

Inbound Rate Limiting Port Configuration Entries
-------------------------------------------------------------------------
Port Group Name  :DFE-P 32 IRL
Port Group       :0
Port Type        :0
Assigned Ports   :ge.1.1-12
-------------------------------------------------------------------------
Port Group Name  :DFE-P 8 IRL
Port Group       :0
Port Type        :1
Assigned Ports   :ge.2.1-30;ge.3.1-30;ge.4.1-30;fe.6.1-48;ge.6.1-6;fe.7.1-72
-------------------------------------------------------------------------
```

7.3.3.6 set cos port-config irl

Use this command to set the Class of Service inbound rate limiting port group configuration:

set cos port-config irl *group-type-index* [**name** *name*] [**ports** *port-list*] [**append**] | [**clear**]

Syntax Description

group-type-index	Specifies an inbound rate limiting port group/type index for this entry. Valid entries are in the form of **group.type**. Group can be 0-7, with 0 designating the default group, and 1-7 reserved for user-defined groups. Default port type values cannot be changed, and are 0 for the Matrix DFE-Platinum 7G4270-12 module, and 1 for all other modules.
name *name*	(Optional) Specifies a name for this configuration.
ports *port-list*	(Optional) Applies this configuration to one or more ports in the port group.
append | **clear**	(Optional) Appends or clears port designations from a previously configured port group.

Command Defaults

- If a **name** is not specified, default names described in Table 7-5 will be applied.
- If not specified, this configuration will be applied to all ports in the port group.
- If **append** or **clear** are not specified, port(s) will be appended to the specified port grouping.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create a CoS inbound rate limiting port group entry named “test irl” with a port group ID of 1 and a port type ID of 1:

```
Matrix(rw)->set cos port-config irl 1.1 name test irl
```

7.3.3.7 clear cos port-config irl

Use this command to clear a non-default Class of Service inbound rate limiting port group configuration:

clear cos port-config irl all | *group-type-index* {[**entry**] | [**name**] | [**ports**]}

Syntax Description

all | *group-type-index*	Clears all inbound rate limiting non-default configurations, or those for a specific user-defined port group index.
entry | **name** | **ports**	Deletes a specific entry or name, or clears the ports assigned to this inbound rate limiting configuration.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete the CoS inbound rate limiting port group entry 1.1:

```
Matrix(rw)->clear cos port-config irl 1.1 entry
```

7.3.3.8 set cos port-config txq

Use this command to set the Class of Service transmit queue port group configuration:

set cos port-config txq *group-type-index* [**name** *name*] [**ports** *port-list*] [**append**] | [**clear**]

Syntax Description

group-type-index	Specifies a transmit queue port group/type index for this entry. Valid entries are in the form of **group.type**. Group can be 0-7, with 0 designating the default group, and 1-7 reserved for user-defined groups. Default port type values cannot be changed, and are 0 for the Matrix DFE-Platinum 7G4270-12 module, and 1 for all other modules.
name *name*	(Optional) Specifies a name for this configuration.
ports *port-list*	(Optional) Applies this configuration to one or more ports in the port group.
append | **clear**	(Optional) Appends or clears port designations from a previously configured port group.

Command Defaults

- If a **name** is not specified, default names described in Table 7-5 will be applied.
- If not specified, this configuration will be applied to all ports in the port group.
- If **append** or **clear** are not specified, port(s) will be appended to the specified port grouping.
- If **arb-slice** or **arb-percentage** values are not specified, default allocations will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create a CoS transmit queue port group entry named “test txq” with a port group ID of 2 and a port type ID of 1:

```
Matrix(rw)->set cos port-config txq 2.1 name test txq
```

7.3.3.9 clear cos port-config txq

Use this command to clear one or all non-default Class of Service transmit queue port group configurations:

clear cos port-config txq all | *group-type-index* {**entry** | **name** | **ports** }

Syntax Description

all | *group-type-index*	Clears all transmit queue port config entries or a specific entry.
entry	Clears all non-default transmit queue entries.
name	Clears the name associated with this transmit queue entry.
ports	Clears the port(s) assigned to this port group.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all non-default CoS transmit queue port group entries:

```
Matrix(rw)->clear cos port-config txq all
```

7.3.3.10 show cos port-resource

Use this command to display Class of Service port resource configuration information.

show cos port-resource irl *group-type-index* [*resource*] [**violators**]

Syntax Description

irl | **txq**	(Optional) Displays inbound rate limiting or transmit queue information.
group-type-index	(Optional) Displays information for a specific port group/type entry.
resource	(Optional) Displays rate limiters or transmit queues associated with this entry.
violators	(Optional) Displays ports that have violated inbound rate limiters.

Command Defaults

If no options are specified, all rate limiting information for all port types will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to show all inbound rate limiting port resource configuration information for port group 0.1:

```
Matrix(rw)->show cos port-resource irl 0.1
'?' after the rate value indicates an invalid rate value

Group Index Resource Type Unit    Rate      Rate Limit Type Action
----------- -------- ---- ---- ----------   --------------- -----
0.1         0        irl  perc none         drop            none
0.1         1        irl  perc none         drop            none
0.1         2        irl  perc none         drop            none
0.1         3        irl  perc none         drop            none
0.1         4        irl  perc none         drop            none
0.1         5        irl  perc none         drop            none
0.1         6        irl  perc none         drop            none
0.1         7        irl  perc none         drop            none
```

7.3.3.11 set cos port-resource irl

Use this command to configure a Class of Service inbound rate limiting port resource entry.

set cos port-resource irl *group-type-index irl-number* {[**unit** {**percentage** | **kbps** | **mbps** | **gbps**}] [**rate** *rate*] [**type** {**drop**}] [**syslog** {**disable** | **enable**}] [**trap** {**disable** | **enable**}] [**disable-port** {**disable** | **enable**}]}

Syntax Description

group-type-index	Specifies an inbound rate limiting port group/type index for this entry. Valid entries are in the form of **group.type**. Group can be 0-7, with 0 designating the default group, and 1-7 reserved for user-defined groups. Default port type values cannot be changed, and are 0 for the Matrix DFE-Platinum 7G4270-12 module, and 1 for all other modules.
irl-number	Specifies an inbound rate limiter ID to be associated with this entry.
unit percentage | **kbps** | **mbps** | **gbps**	Specifies the unit of measure as percentage of total bandwidth, or kilobits, megabits, or gigabits per second.
rate *rate*	(Optional) Data rate in units for this inbound rate limiter.
type drop	(Optional) Specifies that frames exceeding this limiter will be dropped.
syslog disable | **enable**	(Optional) Enables or disables the generation of a Syslog message when this limiter is exceeded.
trap disable | **enable**	(Optional) Enables or disables the sending of an SNMP trap message when this limiter is exceeded.
disable-port disable | **enable**	(Optional) Enables or disables the disabling of the violating port when this limiter is exceeded.

Command Defaults

- If a **rate** is not specified, port defaults will be applied.
- If not specified, frames will not be dropped.
- If not specified, Syslog and port disabling will not be configured.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure Class of Service port resource IRL entry 0 for port group 0.1 assigning an inbound rate limit of 512 kilobits per second This entry will trigger a Syslog and an SNMP trap message if this rate is exceeded:

```
Matrix(rw)->set cos port-resource irl 0.1 0 unit kbps 512 syslog enable trap
  enable
```

7.3.3.12 clear cos port-resource irl

Use this command to clear one or all Class of Service inbound rate limiting port resource configurations:

clear cos port-resource irl all | *group-type-index resource* [**unit**] [**rate**] [**type**] [**syslog**] [**trap**] [**disable-port**] [**violators** *port-list*]

Syntax Description

all | *group-type-index*	Clears all inbound rate limiting port resource entries or a specific entry.
resource	Specifies a resource entry to be cleared.
unit	(Optional) Clears the unit of measure setting.
rate	(Optional) Clears the data rate setting.
type	(Optional) Clears the type of action setting.
syslog	(Optional) Clears the Syslog setting.
trap	(Optional) Clears the SNMP trap setting.
disable-port	(Optional) Clears the disable port setting.
violators *port-list*	(Optional) Clears the limit violation setting.

Command Defaults

If no options are specified, all non-default settings will be cleared for the associated rate limiter.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all inbound rate limiting settings associated with port group 0.1, resource entry 0:

```
Matrix(rw)->clear cos port-resource irl 0.1 0
```

7.3.3.13 set cos port-resource txq

Use this command to configure a Class of Service transmit queue port resource entry.

set cos port-resource txq *group-type-index transmit-queue* {[**unit** {**percentage** | **kbps** | **mbps** | **gbps**}] [**rate** *rate*] [**algorithm** {**tail-drop**}]}

Syntax Description

group-type-index	Specifies a transmit queue port group/type index for this entry. Valid entries are in the form of **group.type**. Group can be 0-7, with 0 designating the default group, and 1-7 reserved for user-defined groups. Default port type values cannot be changed, and are 0 for the Matrix DFE-Platinum 7G4270-12 module, and 1 for all other modules.
transmit-queue	Specifies a transmit queue to be associated with this entry. Valid values are 0-7.
unit percentage | **kbps** | **mbps** | **gbps**	Specifies the unit of measure as percentage of total bandwidth, or kilobits, megabits, or gigabits per second.
rate *rate*	(Optional) Specifies a data rate in units for this transmit queue.
algorithm tail-drop	(Optional) Sets the algorithm by which transmit frames are discarded as discarding frames from the tail of the queue.

Command Defaults

- If a **rate** is not specified, port defaults will be applied.
- If not specified, no algorithm will be assigned.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure a Class of Service port resource entry for port group 0.1 assigning 50 percent of the total available inbound bandwidth to transmit queue 7:

```
Matrix(rw)->set cos port-resource txq 0.1 7 unit percentage 50
```

7.3.3.14 clear cos port-resource txq

Use this command to clear one or all Class of Service transmit queue port resource entry.

clear cos port-resource txq all | *group-type-index resource*[**unit**] [**rate**] [**algorithm**]

Syntax Description

all | *group-type-index*	Clears all transmit queue port resource entries or a specific entry.
resource	Specifies a resource entry to be cleared.
unit	(Optional) Clears unit of measure settings.
rate	(Optional) Clears rate settings.
algorithm tail-drop	(Optional) Clears algorithm settings.

Command Defaults

If no options are specified, all associated non-default settings will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all port resource settings associated with Class of Service transmit queue 1 in port group 0.1:

```
Matrix(rw)->clear cos port-resource txq 0.1 1
```

7.3.3.15 show cos reference

Use this command to display Class of Service port reference information.

show cos reference [**txq** | **irl** *group-type-index* [*reference*]]

Syntax Description

irl | **txq**	(Optional) Displays inbound rate limiting or transmit queue reference information.
group-type-index	(Optional) Displays information for a specific port group/type entry.
reference	(Optional) Displays information for a specific reference entry.

Command Defaults

If no options are specified, all reference information for all port types will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to show all transmit queue reference configuration information for port group 0.1:

```
Matrix(rw)->show cos reference txq 0.1
Group Index Reference Type    Queue
----------- --------- ---- ------------
0.1         0         txq  0
0.1         1         txq  0
0.1         2         txq  0
0.1         3         txq  0
0.1         4         txq  1
0.1         5         txq  1
0.1         6         txq  1
0.1         7         txq  1
0.1         8         txq  2
0.1         9         txq  2
0.1         10        txq  2
0.1         11        txq  2
0.1         12        txq  3
0.1         13        txq  3
0.1         14        txq  3
0.1         15        txq  3
```

7.3.3.16 set cos reference irl

Use this command to set a Class of Service inbound rate limiting reference configuration.

set cos reference irl *group-type-index reference* **rate-limit** *number*

Syntax Description

group-type-index	Specifies an inbound rate limiting port group/type index for this entry. Valid entries are in the form of **group.type**. Group can be 0-7, with 0 designating the default group, and 1-7 reserved for user-defined groups. Default port type values cannot be changed, and are 0 for the Matrix DFE-Platinum 7G4270-12 module, and 1 for all other modules.
reference	Specifies a reference number to be associated with this entry.
rate-limit *number*	Specifies a rate limiter resource ID to bind to this entry.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure inbound rate limiting reference entry 0 for port group 0.1 referencing resources defined by IRL resource entry 0:

```
Matrix(rw)->set cos reference irl 0.1 0 rate-limit 0
```

7.3.3.17 clear cos reference irl

Use this command to clear one or all Class of Service inbound rate limiting reference configurations.

clear cos reference irl {**all** | *group-type-index reference*}

Syntax Description

all | *group-type-index*	Clears all non-default inbound rate limiting reference entries or a specific entry.
reference	Specifies a reference number of the entry to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all Class of Service inbound rate limiting reference entries:

```
Matrix(rw)->clear cos reference irl all
```

7.3.3.18 set cos reference txq

Use this command to set a Class of Service inbound rate limiting reference configuration.

set cos reference txq *group-type-index reference* **queue** *number*

Syntax Description

group-type-index	Specifies a transmit queue port group/type index for this entry. Valid entries are in the form of **group.type**. Group can be 0-7, with 0 designating the default group, and 1-7 reserved for user-defined groups. Default port type values cannot be changed, and are 0 for the Matrix DFE-Platinum 7G4270-12 module, and 1 for all other modules.
reference	Specifies a reference number to be associated with this entry.
queue *number*	Specifies a transmit queue resource ID to bind to this entry.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure inbound rate limiting reference entry 0 for port group 0.1 referencing resources defined by TXQ resource entry 0:

```
Matrix(rw)->set cos reference irl 0.1 0 queue 0
```

7.3.3.19 clear cos reference txq

Use this command to clear one or all non-default Class of Service transmit queue reference configurations.

clear cos reference txq {**all** | *group-type-index reference*}

Syntax Description

all | *group-type-index*	Clears all non-default transmit queue reference entries or a specific entry.
reference	Specifies a reference number of the entry to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all Class of Service transmit queue reference entries:

```
Matrix(rw)->clear cos reference txq all
```

7.3.3.20 show cos settings

Use this command to display Class of Service parameters.

show cos settings [*cos-list*]

Syntax Description

cos-list	(Optional) Specifies a Class of Service entry to display.

Command Defaults

If not specified, all CoS entries will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to show all CoS settings:

```
Matrix(rw)->show cos settings
* Means attribute has not been configured

CoS Index  Priority    ToS      TxQ    IRL
---------  ----------  -------  -----  -----
0          0           *        0      *
1          1           *        2      *
2          2           *        4      *
3          3           *        6      *
4          4           *        8      *
5          5           *        10     *
6          6           *        12     *
7          7           *        14     *
```

7.3.3.21 set cos settings

Use this command to configure a Class of Service entry.

set cos settings *cos-list* [**priority** *priority*] [**tos-value** *tos-value*] [**txq-reference** *txq-reference*] [**irl-reference** *irl-reference*]

Syntax Description

cos-list	Specifies a Class of Service entry. Valid values are 0 - 255.
priority *priority*	(Optional) Specifies a CoS priority value. Valid values are **0** - **7**, with 0 being the lowest priority.
tos-value *tos-value*	(Optional) Specifies a Type of Service value with mask in the format of 0 - 255:0 - 255 or 0 - 0xFF:0 - 0xFF.
txq-reference *txq-reference*	(Optional) Specifies the transmit queue associated with this entry. Valid values are 0 - 15
irl-reference *irl-reference*	(Optional) Specifies the inbound rate limiter associated with this entry. Valid values are 0 - 31.

Command Defaults

If no optional parameters are specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create CoS entry 2 with a priority value of 3 and bind it to transmit queue reference ID 5:

```
Matrix(rw)->set cos settings 2 priority 3 txq-reference 5
```

7.3.3.22 clear cos settings

Use this command to clear Class of Service entry settings.

clear cos settings *cos-list* {[**all**] | [**priority**] [**tos-value**] [**txq-reference**] [**irl-reference**]}

Syntax Description

cos-list	Specifies a Class of Service entry to clear.
all	Clears all settings associated with this entry.
priority	Clears the priority value associated with this entry.
tos-value	Clears the Type of Service value associated with this entry.
txq-reference	Clears the transmit queue reference associated with this entry.
irl-reference	Clears the inbound rate limiting reference associated with this entry.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the priority and transmit queue reference values for CoS entry 2:

```
Matrix(rw)->clear cos settings 2 priority txq-reference
```

7.3.3.23 show cos violation irl

Use this command to display Class of Service violation configurations.

show cos violation irl [*violation-index]*

Syntax Description

violation-index	(Optional) Displays information for a specific violation index. Valid entries are in the form of *port-list*:*irl-lis*t, or *.*.*:* for all entries.

Command Defaults

If no options are specified, all inbound rate limiting violation information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to show any CoS inbound rate limiting violations:

```
Matrix(rw)->show cos violation irl
There are no ports disabled by any irl rate limiters
```

7.3.3.24 clear cos violation irl

Use this command to clear Class of Service inbound rate limiting violation configurations.

clear cos violation irl {**all** | **disabled-ports** | *violation-index*} {**both** | **status** | **counter**}

Syntax Description

all	Clears all inbound rate limiting violation entries.
disabled-ports	Clears the list of ports that are disabled because of violating an inbound rate limiter.
violation-index	Clears the entry for a specific violation index.
both | **status** | **counter**	Clears the violation status, the violation counter, or both.

Command Defaults

If no options are specified, all information for all types of CoS violations will be displayed.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear both status and counters from all CoS inbound rate limiting violation entries:

```
Matrix(rw)->clear cos violation irl all both
```

7.3.3.25 clear cos all-entries

Use this command to clears all Class of Service entries except priority settings 0 - 7.

clear cos all-entries

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all Class of Service entries except priority settings 0 - 7:

```
Matrix(rw)->clear cos all-entries
```

8

Port Priority and Rate Limiting Configuration

This chapter describes the Port Priority and Rate Limiting set of commands and how to use them.

8.1 PORT PRIORITY CONFIGURATION SUMMARY

The Matrix Series device supports Class of Service (CoS), which allows you to assign mission-critical data to higher priority through the device by delaying less critical traffic during periods of congestion. The higher priority traffic through the device is serviced first before lower priority traffic. The Class of Service capability of the device is implemented by a priority queueing mechanism. Class of Service is based on the IEEE 802.1D (802.1p) standard specification, and allows you to define eight priorities (0 through 7) and, depending on port type, up to 16 transmit queues (0-15) of traffic for each port.

A priority 0 through 7 can be set on each port, with 0 being the lowest priority. A port receiving a frame without priority information in its tag header is assigned a priority according to the default priority setting on the port. For example, if the priority of a port is set to 4, the frames received through that port without a priority indicated in their tag header are classified as a priority 4 and transmitted according to that priority.

In addition, the device's rate limiting capabilities allow you to further prioritize traffic by limiting the rate of inbound or outbound traffic on a per port/priority basis.

Enterasys Networks' enhanced CoS implementation allows you to use the following methods to configure Class of Service on the Matrix Series device:

- Configuring transmit queueing and rate limiting on a per-port basis as described in this chapter.
- Allowing the device to assign policy-based inbound rate limiters and transmit queues as described in Chapter 7.

NOTE: When CoS override is enabled using the **set policy profile** command as described in Section 7.3.1.2, CoS-based classification rules will take precedence over priority settings configured with the **set port priority** command described in this section.

8.2 PROCESS OVERVIEW: PORT PRIORITY AND RATE LIMITING CONFIGURATION

Use the following steps as a guide to the port priority, QoS, and rate limiting configuration process:

1. Configuring Port Priority (Section 8.3.1)
2. Configuring Priority Queueing (Section 8.3.2)
3. Configuring Port Traffic Rate Limiting (Section 8.3.3)

8.3 PORT PRIORITY AND RATE LIMITING CONFIGURATION COMMAND SET

8.3.1 Configuring Port Priority

Purpose

To view or configure port priority characteristics as follows:

- Display or change the port default Class-of Service (CoS) transmit priority (0 through 7) of each port for frames that are received (ingress) without priority information in their tag header.
- Display the current traffic class mapping-to-priority of each port.
- Set each port to transmit frames according to 802.1D (802.1p) priority transmit queues set in the frame header.

Commands

The commands to configure port priority are listed below and described in the associated section.

- show port priority (Section 8.3.2.1)
- set port priority (Section 8.3.1.2)
- clear port priority (Section 8.3.1.3)

8.3.1.1 show port priority

Use this command to display the 802.1D priority for one or more ports.

show port priority [*port-string*]

Syntax Description

port-string	(Optional) Displays priority information for a specific port. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, priority for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the port priority for the fe.2.1 through 5;

```
Matrix(rw)->show port priority fe.2.1-5
fe.2.1 is set to 0
fe.2.2 is set to 0
fe.2.3 is set to 0
fe.2.4 is set to 0
fe.2.5 is set to 0
```

8.3.1.2 set port priority

Use this command to set the 802.1D (802.1p) Class-of-Service transmit queue priority (0 through 7) on each port. A port receiving a frame without priority information in its tag header is assigned a priority according to the priority setting on the port. For example, if the priority of a port is set to 5, the frames received through that port without a priority indicated in their tag header are classified as a priority 5.

A frame with priority information in its tag header is transmitted according to that priority.

NOTES: For information on how to configure protocol-based policy classification to a Class-of-Service, including how to configure a CoS policy to override port transmit queue priority, refer to Chapter 7.

When CoS override is enabled using the **set policy profile** command as described in Section 7.3.1.2, CoS-based classification rules will take precedence over priority settings configured with this command.

set port priority *port-string priority*

Syntax Description

port-string	Specifies the port for which to set priority. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
priority	Specifies a value of **0 - 7** to set the CoS port priority for the port entered in the *port-string*. Port priority value of 0 is the lowest priority.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set a default priority of 6 on fe.1.3. Frames received by this port without priority information in their frame header are set to the default setting of 6:

```
Matrix(rw)->set port priority fe.1.3 6
```

8.3.1.3 clear port priority

Use this command to reset the current CoS port priority setting to 0. This will cause all frames received without a priority value in its header to be set to priority 0.

clear port priority *port-string*

Syntax Description

port-string	Specifies the port for which to clear priority. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset fe.1.11 to the default priority:

```
Matrix(rw)->clear port priority fe.1.11
```

8.3.2 Configuring Priority to Transmit Queue Mapping

Purpose

To perform the following:

- View the current priority to transmit queue mapping of each port, which includes both physical and virtual ports.
- Configure each port to either transmit frames according to the port priority transmit queues (set using the **set port priority** command described back in Section 8.3.1.2), or according to a priority based on a percentage of port transmission capacity (set using the **set priority queue** command described in Section 8.3.2.2).
- Clear current port priority queue settings for one or more ports.

Commands

The commands used in configuring transmit priority queues are listed below and described in the associated section.

- show port priority-queue (Section 8.3.2.1)
- set port priority-queue (Section 8.3.2.2)
- clear port priority-queue (Section 8.3.2.3)

8.3.2.1 show port priority-queue

Use this command to display the port priority levels (0 through 7, with 0 as the lowest level) associated with the current transmit queue (0 - 15 depending on port type, with 0 being the lowest priority) for each priority of the selected port. A frame with a certain port priority is transmitted according to the settings entered using the **set priority queue** command described in Section 8.3.2.2.

show port priority-queue [*priority*]

Syntax Description

priority	(Optional) Displays queue levels for a specific priority value.

Command Defaults

If *priority* is not specified, all priority queue information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display priority queue information for fe.1.7. In this case, the frames shown with a priority of 0 or 3 are transmitted according to the transmit priority queue of 1 (the second lowest transmit priority); frames with 1 or 2 priority, at the lowest transmit priority of 0; frames with 4 or 5 priority, at the second highest transmit priority of 2; and frames with 6 or 7 priority, at the highest transmit priority of 3:

```
Matrix(rw)->show port priority-queue fe.1.7
fe.1.7      Priority  TxQueue
----------  --------  -------
               0         1
               1         0
               2         0
               3         1
               4         2
               5         2
               6         3
               7         3
```

This example shows how to display the transmit queues associated with priority 3.

```
Matrix(rw)->show port priority-queue 3
fe.1.7     Priority  TxQueue
----------  --------  -------
               3         1
fe.1.8     Priority  TxQueue
----------  --------  -------
               3         1
fe.1.9     Priority  TxQueue
----------  --------  -------
               3         1
```

8.3.2.2 set port priority-queue

Use this command to map 802.1D (802.1p) priorities to transmit queues. This enables you to change the priority queue (0-7, depending on port type, with 0 being the lowest priority queue) for each port priority of the selected port. You can apply the new settings to one or more ports.

For example, if the priority queue is set to 3 for those frames with a port priority 4, then those frames would be transmitted before any frames contained in traffic classes 2 through 0.

set port priority-queue *port-string priority queue*

Syntax Description

port-string	Specifies the port(s) for which to set priority queue. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
priority	Specifies a value of **0** - **7**(0 is the lowest level) that determines what priority frames will be transmitted at the priority queue level entered in this command.
queue	Specifies a value (0 is the lowest level) that determines when to transmit the frames with the port priority entered in this command. Number of transmit queues varies by port type. Typical values are: • 100Base-T - **4** • 1000Base-T - **4** • 1000Base-X - **8**

Command Defaults

None.

Command Mode

Read-Write.

Example

This example shows how to set priority 5 frames received on fe.2.12 to transmit at the lowest priority queue of 0.

```
Matrix(rw)->set port priority-queue fe.2.12 5 0
```

8.3.2.3 clear port priority-queue

Use this command to reset port priority queue settings back to defaults for one or more ports.

clear port priority-queue *port-string*

Syntax Description

port-string	Specifies the port for which to clear priority queue. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the priority queue settings on fe.2.12:

```
Matrix(rw)->clear port priority-queue fe.2.12
```

8.3.3 Configuring Port Traffic Rate Limiting

Purpose

To limit the rate of inbound traffic on the Matrix Series device on a per port/priority basis. The allowable range for the rate limiting is 125 kilobytes per second minimum up to the maximum transmission rate allowable on the interface type.

Rate limit is configured for a given port and list of priorities. The list of priorities can include one, some, or all of the eight 802.1p priority levels. Once configured, the rate of all traffic entering or leaving the port with the priorities configured to that port is not allowed to exceed the programmed limit. If the rate exceeds the programmed limit, frames are dropped until the rate falls below the limit.

Commands

The commands to configure traffic rate limiting are listed below and described in the associated section.

- show port ratelimit (Section 8.3.3.1)
- set port ratelimit (Section 8.3.3.2)
- clear port ratelimit (Section 8.3.3.3)

8.3.3.1 show port ratelimit

Use this command to show the traffic rate limiting configuration on one or more ports.

show port ratelimit [*port-string*]

Syntax Description

port-string	(Optional) Displays rate limiting information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, rate limiting information will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the current rate limiting information for fe.2.1:

```
Matrix(rw)->show port ratelimit fe.2.1
Global Ratelimiting status is disabled.

    Port            Threshold                                  Priority
   Number    Index   (kB/s)       Action     Direction          List       Status
-----------  -----  ---------  ------------  ---------  -----------  --------
fe.2.1           1    125          discard    inbound            0    disabled
fe.2.1           2    125          discard    inbound            0    disabled
fe.2.1           3    125          discard    inbound            0    disabled
fe.2.1           4    125          discard    inbound            0    disabled
fe.2.1           5    125          discard    inbound            0    disabled
fe.2.1           6    125          discard    inbound            0    disabled
fe.2.1           7    125          discard    inbound            0    disabled
fe.2.1           8    125          discard    inbound            0    disabled
fe.2.1           9    125          discard    inbound            0    disabled
fe.2.1          10    125          discard    inbound            0    disabled
fe.2.1          11    125          discard    inbound            0    disabled
fe.2.1          12    125          discard    inbound            0    disabled
```

Table 8-1 shows a detailed explanation of the command output.

Table 8-1 show port ratelimit Output Details

Output	What It Displays...
Port Number	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
Index	Resource index for this port.
Threshold (kB/s)	Port rate limiting threshold in kilobytes per second.
Action	Whether or not frames not conforming to rate limiting will be discarded.
Direction	This rule applies to inbound traffic.
Priority List	802.1D (802.1p) port priority level.
Status	Whether or not this rule is active or disabled.

8.3.3.2 set port ratelimit

Use this command to configure the traffic rate limiting status and threshold (in kilobytes per second) for one or more ports.

set port ratelimit {**disable** | **enable**} | *port-string priority threshold* {**disable** | **enable**} [**inbound**] [*index*]

Syntax Description

disable | enable	When entered without a *port-string*, globally disables or enables the port rate limiting function. When entered with a *port-string*, disables or enables rate limiting on specific port(s) when the global function is enabled.
port-string	Specifies a port on which to set the rate limiting threshold and other parameters. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
priority	Specifies the 802.1D (802.1p) port priority level associated with the *port-string*. Options are: • **0 - 7**, with 0 specifying the lowest priority, and • **all** to set the rate limiting threshold and other parameters on all port priority levels associated with the *port-string*.
threshold	Specifies a port rate limiting threshold in kilobytes per second. Range is **64** up to the maximum bytes per second rate for a given interface.
inbound	(Optional) Applies this rate policing rule to inbound or outbound traffic.
index	(Optional) Assigns a resource index for this port.

Command Defaults

- If not specified, threshold will be applied to inbound traffic on the port/priority.
- If *index* is not specified, settings will be applied to index 1, and will overwrite index 1 for any subsequent rate limits configured.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to:

- globally enable rate limiting
- configure rate limiting for inbound traffic on port fe.2.1, index 1, priority 5, to a threshold of 125 KBps:

```
Matrix(rw)->set port ratelimit enable
Matrix(rw)->set port ratelimit fe.2.1 5 125 enable inbound
```

8.3.3.3 clear port ratelimit

Use this command to clear rate limiting parameters for one or more ports.

clear port ratelimit *port-string* [*index*]

Syntax Description

port-string	Specifies the port(s) on which to clear rate limiting. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
index	(Optional) Specifies the associated resource index to be reset.

Command Defaults

If not specified, all *index* entries will be reset.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all rate limiting parameters on port fe.2.1:

```
Matrix(rw)->clear port ratelimit fe.2.1
```

9

IGMP Configuration

This chapter describes the IGMP Configuration set of commands and how to use them.

9.1 ABOUT IP MULTICAST GROUP MANAGEMENT

The Internet Group Management Protocol (IGMP) runs between hosts and their immediately neighboring multicast switch device. The protocol's mechanisms allow a host to inform its local switch device that it wants to receive transmissions addressed to a specific multicast group.

A multicast-enabled switch device can periodically ask its hosts if they want to receive multicast traffic. If there is more than one switch device on the LAN performing IP multicasting, one of these devices is elected "querier" and assumes the responsibility of querying the LAN for group members.

Based on the group membership information learned from IGMP, a switch device can determine which (if any) multicast traffic needs to be forwarded to each of its ports. At Layer-3, multicast switch devices use this information, along with a multicast routing protocol, to support IP multicasting across the Internet.

IGMP provides the final step in an IP multicast packet delivery service since it is only concerned with forwarding multicast traffic from the local switch device to group members on a directly attached subnetwork or LAN segment.

This switch device supports IP multicast group management by

- passively snooping on the IGMP query and IGMP report packets transferred between IP multicast switches and IP multicast host groups to learn IP multicast group members, and
- actively sending IGMP query messages to solicit IP multicast group members.

The purpose of IP multicast group management is to optimize a switched network's performance so multicast packets will only be forwarded to those ports containing multicast group hosts or multicast switch devices instead of flooding to all ports in the subnet (VLAN).

In addition to passively monitoring IGMP query and report messages, the Matrix Series device can also actively send IGMP query messages to learn locations of multicast switches and member hosts in multicast groups within each VLAN.

However, note that IGMP neither alters nor routes any IP multicast packets. Since IGMP is not concerned with the delivery of IP multicast packets across subnetworks, an external IP multicast switch device is needed if IP multicast packets have to be routed across different subnetworks.

9.2 IGMP CONFIGURATION SUMMARY

Multicasting is used to support real-time applications such as video conferences or streaming audio. A multicast server does not have to establish a separate connection with each client. It merely broadcasts its service to the network, and any hosts that want to receive the multicast register with their local multicast switch/router. Although this approach reduces the network overhead required by a multicast server, the broadcast traffic must be carefully pruned at every multicast switch/router it passes through to ensure that traffic is only passed to the hosts that subscribed to this service.

The Matrix Series switch device uses IGMP (Internet Group Management Protocol) to query for any attached hosts who want to receive a specific multicast service. The device looks up the IP Multicast Group used for this service and adds any port that received a similar request to that group. It then propagates the service request on to any neighboring multicast switch/router to ensure that it will continue to receive the multicast service.

9.3 PROCESS OVERVIEW: IGMP CONFIGURATION

Use the following steps as a guide in the IGMP configuration process:

1. Enabling / disabling IGMP (Section 9.4.1)
2. Configuring IGMP (Section 9.4.2)

9.4 IGMP CONFIGURATION COMMAND SET

9.4.1 Enabling / Disabling IGMP

Purpose

To display IGMP information and to enable or disable IGMP snooping on the device.

Commands

The commands used to display, enable and disable IGMP are listed below and described in the associated sections as shown.

- show igmp enable (Section 9.4.1.1)
- set igmp enable (Section 9.4.1.2)
- set igmp disable (Section 9.4.1.3)

9.4.1.1 show igmp enable

Use this command to display the status of IGMP on one or more VLAN(s).

show igmp enable *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN(s) for which to display IGMP status.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the IGMP status for VLAN 104:

```
Matrix(rw)->show igmp enable 104
IGMP Default State for vlan 104 is Disabled
```

9.4.1.2 set igmp enable

Use this command to enable IGMP on one or more VLANs.

set igmp enable *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN(s) on which to enable IGMP.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable IGMP on VLAN 104:

```
Matrix(rw)->set igmp enable 104
```

9.4.1.3 set igmp disable

Use this command to disable IGMP on one or more VLANs.

set igmp enable *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN(s) on which to enable IGMP.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable IGMP on VLAN 104:

```
Matrix(rw)->set igmp disable 104
```

9.4.2 Configuring IGMP

Purpose

To display and set IGMP configuration parameters, including query interval and response time settings, and to create and configure static IGMP entries.

Commands

The commands used to configure IGMP are listed below and described in the associated sections as shown.

- show igmp query (Section 9.4.2.1)
- set igmp query-enable (Section 9.4.2.2)
- set igmp query-disable (Section 9.4.2.3)
- show igmp grp-full-action (Section 9.4.2.4)
- set igmp grp-full-action (Section 9.4.2.5)
- show igmp config (Section 9.4.2.6)
- set igmp config (Section 9.4.2.7)
- set igmp delete (Section 9.4.2.8)
- show igmp groups (Section 9.4.2.9)
- show igmp static (Section 9.4.2.10)
- set igmp add-static (Section 9.4.2.11)
- set igmp remove-static (Section 9.4.2.12)
- show igmp protocols (Section 9.4.2.13)
- set igmp protocols (Section 9.4.2.14)
- clear igmp protocols (Section 9.4.2.15)
- show igmp vlan(Section 9.4.2.16)
- show igmp reporters(Section 9.4.2.17)
- show igmp flow(Section 9.4.2.18)
- show igmp counters(Section 9.4.2.19)
- show igmp number-groups (Section 9.4.2.20)

9.4.2.1 show igmp query

Use this command to display the IGMP query status of one or more VLANs.

show igmp query *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN(s) for which to display IGMP query state.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the IGMP query state for VLAN 1:

```
Matrix(rw)->show igmp query 1
IGMP querying on vlan 1 is Disabled
```

9.4.2.2 set igmp query-enable

Use this command to enable IGMP querying on one or more VLANs.

set igmp query-enable *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN(s) on which to enable IGMP querying.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable IGMP querying on VLAN 104:

```
Matrix(rw)->set igmp query-enable 104
```

9.4.2.3 set igmp query-disable

Use this command to disable IGMP querying on one or more VLANs.

set igmp query-disable *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN(s) on which to disable IGMP querying.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable IGMP querying on VLAN 104:

```
Matrix(rw)->set igmp query-disable 104
```

9.4.2.4 show igmp grp-full-action

Use this command to show what action to take with multicast frames when the multicast IGMP group table is full

show igmp grp-full-action

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the action taken for multicast frames when the IGMP group table is full:

```
Matrix(rw)->show igmp grp-full-action
Group Table Full Action: Flood to Vlan
```

9.4.2.5 set igmp grp-full-action

Use this command to determine what action to take with multicast frames when the multicast group table is full.

set igmp grp-full-action *action*

Syntax Description

action	Specifies the action to take when the multicast Group Table is full. The options are: • **1**-send multicast frames to Routers • **2**-flood multicast frames to the VLAN

Command Defaults

Flood multicast frames to the Vlan

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to flood multicast frames to the VLAN when the multicast group table is full:

```
Matrix(rw)->set igmp grp-full-action 2
```

9.4.2.6 show igmp config

Use this command to display IGMP configuration information for one or more VLANs.

show igmp config *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN(s) for which to display IGMP configuration information.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display IGMP configuration information for VLAN 1:

```
Matrix(rw)->show igmp config 1
IGMP config for vlan 1
VlanQueryInterval         - 125
VlanStatus                - Active
Vlan IGMP Version         - 2
VlanQuerier               - 134.141.22.1
VlanQueryMaxResponseTime  - 10
VlanRobustness            - 2
VlanLastMemberQueryIntvl  - 10
VlanQuerierUpTime         - 24039
```

Table 9-1 shows a detailed explanation of command output. For details on using the **set igmp config** command to set these parameters, refer to Section 9.4.2.7.

Table 9-1 show igmp config Output Details

Output	What It Displays...
VlanQueryInterval	Frequency (in seconds) of host-query frame transmissions.
VlanStatus	Whether or not VLAN configuration is **Active** or **Not in Service**.
Vlan IGMP Version	Whether or not IGMP version is **1** or **2**.
VlanQuerier	IP address of the IGMP querier.
VlanQueryMaxResponse Time	Maximum query response time (in tenths of a second).
VlanRobustness	Robustness value
VlanLastMemberQueryIntvl	Last member query interval. This is the maximum response time inserted into group-specific queries which are sent in response to Leave Group messages. It is also the amount of time between group-specific query messages.
VlanQuerierUpTime	Time (in seconds) the IGMP querier has been active.

9.4.2.7 set igmp config

Use this command to configure IGMP settings on one or more VLANs.

set igmp config *vlan-list* {[**query-interval** *query-interval*] **[igmp-version** *igmp-version*] [**max-resp-time** *max-resp-time*] [**robustness** *robustness*] [**last-mem-int** *last-mem-int*]}

Syntax Description

vlan-list	Specifies the VLAN(s) on which to configure IGMP.
query-interval *query-interval*	(Optional) Specifies the frequency of host-query frame transmissions. Valid values are from **1** to **65535** seconds. This value works together with *max-resp-time* to remove ports from an IGMP group.
igmp-version *igmp-version*	(Optional) Specifies the IGMP version. Valid values are: • **1** - IGMP V1 • **2** - IGMP V2
max-resp-time *max-resp-time*	(Optional) Specifies the maximum query response time. Valid values are **1** to **25** seconds. This value works together with *query-interval* to remove ports from an IGMP group.
robustness *robustness*	(Optional) Specifies the robustness value. This can be increased to tune for expected packet loss on a subnet. Valid values are **2** to **255.**
last-mem-int *last-mem-int*	(Optional) Specifies the Last Member Query Interval. This is the maximum response time inserted into group-specific queries which are sent in response to Leave Group messages. It is also the amount of time between group-specific query messages. Valid values are **1** to **255.**

Command Defaults

At least one optional parameter must be specified.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the IGMP query interval time to 250 seconds on VLAN 1:

```
Matrix(rw)->set igmp config 1 query-interval 250
```

9.4.2.8 set igmp delete

Use this command to remove IGMP configuration settings for one or more VLANs.

set igmp delete *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN(s) on which configuration settings will be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove IGMP configuration settings for VLAN 104:

```
Matrix(rw)->set igmp delete 104
```

9.4.2.9 show igmp groups

Use this command to display information about IGMP groups known to one or more VLANs.

show igmp groups [group <*group*>**] [vlan-list <***vlan-list*>**] [sip** <*sip*>**] [-verbose]**

Syntax Description

group	Group IP address (Entering no IP address shows all groups)
vlan-list	Specifies the VLAN(s) for which to display IGMP group information.
sip	Source IP address (Entering no sip shows all sips)
-verbose	Show verbose display

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display IGMP group information for VLAN 105. In this example, the device knows to forward all multicast traffic for IP group address 224.0.0.2 (VLAN 105) to Fast Ethernet port 2 in module 2, and 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->show igmp groups 105
------------------------------------------------------------
Vlan Id       = 105 Multicast Group Address = 224.0.0.2    Type = IGMP
IGMP Port List = fe.2.2 ge.3.14
```

9.4.2.10 show igmp static

Use this command to display static IGMP ports for one or more VLANs or IGMP groups.

show igmp static *vlan-list* [**group** *group*]

Syntax Description

vlan-list	Specifies the VLAN(s) for which to display static IGMP information.
group *group*	(Optional) Displays information for a specific IGMP group (IP address).

Command Defaults

If not specified, static IGMP information will be displayed for all groups.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display static IGMP information for VLAN 105. The display is similar to the **show igmp groups** display:

```
Matrix(rw)->show igmp static 105
------------------------------------------------------------
Vlan Id       = 105 Multicast Group Address = 224.0.0.2    Type = IGMP
IGMP Port List = fe.2.2 ge.3.14
```

9.4.2.11 set igmp add-static

Use this command to create a new static IGMP entry, or to add one or more new ports to an existing entry.

set igmp add-static *group vlan-list* [**modify**] [**include-ports**] [**exclude-ports**]

Syntax Description

group	Specifies a group IP address for the entry.
vlan-list	Specifies the VLAN(s) on which to configure the entry.
modify	Adds new ports to an existing entry.
include-ports	Port or range of ports
exclude-ports	Port or range of ports

Command Defaults

If not specified, the static entry will be created and not modified.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to add port fe.1.3 to the IGMP group at 224.0.2 (VLAN 105):

```
Matrix(rw)->set igmp add-static 224.0.0.2 105 modify
include-ports fe.1.3
```

9.4.2.12 set igmp remove-static

Use this command to delete a static IGMP entry, or to remove one or more ports from an existing entry.

set igmp remove-static *group vlan-list* [**modify**] [**include-ports**] [**exclude-ports**]

Syntax Description

group	Specifies a group IP address for the entry.
vlan-list	Specifies the VLAN(s) on which to configure the entry.
modify	Adds new ports to an existing entry.
include-ports	Port or range of ports
exclude-ports	Port or range of ports

Command Defaults

If not specified, the static entry will be removed and not modified.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove port fe.1.3 from the IGMP group at 224.0.2 (VLAN 105):

```
Matrix(rw)->set igmp remove-static 224.0.0.2 105 modify
include-ports fe.1.3
```

9.4.2.13 show igmp protocols

Use this command to display the binding of IP protocol id to IGMP classification

show igmp protocols

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the binding of IP protocol id to IGMP classification:

```
Matrix(rw)->show igmp protocols
Protocol Classifications

Protocol Ids set to Mcast Data
17

Protocol Ids set to routing Protocol
3,7-9,42-43,45,47-48,85-86,88-89,91-92,100,103,112

Protocol Ids set to Ignore
0,4-6,10-16,18-41,44,46,49-84,87,90,93-99,101-102,104-111,113-255
```

9.4.2.14 set igmp protocols

Use this command to changes the IGMP classification of received IP frames

set igmp protocols [**classification** *classification*] [**protocol-id** *protocol-id*] [**modify**]

Syntax Description

classification *classification*	Specifies the classification. Options are: • **1**-multicast data • **2**-routing protocol • **3**-ignore
protocol-id *protocol-id*	The protocol ids to change(0-255).
modify	Add to existing classifications. If not used, protocols will be overwritten.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to change IGMP routing protocols to a protocol id of 3:

```
Matrix(rw)->set igmp protocols classification 2 protocol-id 3
modify
```

9.4.2.15 clear igmp protocols

Use this command to clear the binding of IP protocol id to IGMP classification

clear igmp protocols [**protocol-id** *protocol-id*]

Syntax Description

protocol-id *protocol-id*	The protocol ids to change(0-255).

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear IGMP protocols for protocol id 3:

```
Matrix(rw)->clear igmp protocols protocol-id 3
```

9.4.2.16 show igmp vlan

Use this command to display IGMP information for a specific VLAN.

show igmp vlan [*vlan-list*]

Syntax Description

vlan *vlan-list*	Show IGMP info for the given VLAN.

Command Defaults

None

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display igmp information for vlan 12:

```
Matrix(rw)->show igmp vlan 12
IGMP Vlan 12 Info
IGMP query state            : Enabled
QueryInterval(sec.)         : 125
Status                      : Active
IGMP Version                : 2
Querier                     : 2.25.0.1
QueryMaxResponseTime(sec.)  : 10
Robustness                  : 2
LastMemberQueryIntvl(sec.)  : 10
QuerierUpTime               : 4 D  23 H  8 M
Router(s) on ports          : none.
Egressing ports             : lag.0.1-2,4
```

9.4.2.17 show igmp reporters

Use this command to display IGMP reporter information.

show igmp reporters [**portlist** *portlist*] [**group** *group*] [**vlan-list** *vlan-list*] [**sip** *sip*]

Syntax Description

[**portlist** *portlist*]	*portlist* - Port or range of ports.
[**group** *group*]	*group* - group IP address (none means show all groups)
[**vlan-list** *vlan-list*]	*vlan-list* - VLAN ID or range of IDs (1-4094)
[**sip** *sip*]	*sip* - source IP address (none means show all sips)

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the all IGMP reporter information :

```
Matrix(rw)->show igmp reporters
IGMP Reporters

 Port    Group Address  Vlan Source IP ExpireTime(Sec) Flags
 ------------------------------------------------------------
 lag.0.2  224.0.0.251     1   Any     252             DYNAMIC
 lag.0.2  239.255.12.43   1   Any     253             DYNAMIC
 lag.0.2  239.255.255.250 1   Any     255             DYNAMIC
 lag.0.2  239.255.255.250 20  Any     249             DYNAMIC
 lag.0.4  235.80.68.83    20  Any     237             DYNAMIC
 lag.0.4  239.255.255.250 20  Any     243             DYNAMIC
```

9.4.2.18 show igmp flow

Use this command to display IGMP flow information.

show igmp flows [**portlist** *portlist*] [**group** *group*] [**vlan-list** *vlan-list*] [**sip** *sip*]

Syntax Description

[**portlist** *portlist*]	*portlist* - Port or range of ports.
[**group** *group*]	*group* - group IP address (none means show all groups)
[**vlan-list** *vlan-list*]	*vlan-list* - VLAN ID or range of IDs (1-4094)
[**sip** *sip*]	*sip* - source IP address (none means show all sips)

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display all the IGMP flow information:

```
Matrix(rw)->show igmp counters
Multicast Flows

 Src Port   Group Address   Vlan      Src IP
 ------------------------------------------------
 fe.1.20     224.1.1.1       1      45.67.89.23
 fe.1.36     224.1.1.2       1      39.47.23.67
```

9.4.2.19 show igmp counters

Use this command to display IGMP counter information.

show igmp counters

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the IGMP counters:

```
Matrix(rw)->show igmp counters
Igmp Counters:
 Igmp Group Table is Full                 : false
 Igmp Version 1 Queries transmitted       : 0
 Igmp Version 2 Queries transmitted       : 1016368
 Igmp Version 3 Queries transmitted       : 0
 Igmp Group Specific Queries transmitted  : 0
 Igmp Queries received                    : 776482
 Igmp Version 1 Joins received            : 0
 Igmp Version 2 Joins received            : 1024
 Igmp Version 3 Joins received            : 22
 Igmp Leave Groups received               : 0
 Igmp Dropped Frames                      : 22
```

9.4.2.20 show igmp number-groups

Use this command to display the number of multicast groups supported by the Matrix device. The command displays both the currently active number of groups and the configured number that will take effect at the next reboot.

show igmp number-groups

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-write.

Example

This example shows how to display the number of multicast groups supported by the device.

```
Matrix(rw)->show igmp number-groups
IGMP current max number of groups = 4096
IGMP stored max number of groups = 4096
```

10

Logging and Network Management

This chapter describes switch-related logging and network management commands and how to use them.

NOTE: The commands in this section pertain to network management of the Matrix Series device from the **switch CLI** only. For information on router-related network management tasks, including reviewing router ARP tables and IP traffic, refer to Chapter 11.

10.1 PROCESS OVERVIEW: NETWORK MANAGEMENT

Switch-related network management tasks include the following:

- Configuring System Logging (Section 10.2.1)
- Monitoring Network Events and Status (Section 10.2.2)
- Configuring SMON (Section 10.2.3)
- Configuring RMON (Section 10.2.4)
- Managing Network Addresses and Routes (Section 10.2.5)
- Configuring SNTP (Section 10.2.6)
- Configuring Node Aliases (Section 10.2.7)
- Configuring NetFlow (Section 10.2.8)

10.2 LOGGING AND NETWORK MANAGEMENT COMMAND SET

10.2.1 Configuring System Logging

Purpose

To display and configure system logging, including Syslog server settings, logging severity levels for various applications, Syslog default settings, and the logging buffer.

Commands

Commands to configure system logging are listed below and described in the associated section as shown.

- show logging all (Section 10.2.1.1)
- show logging server (Section 10.2.1.2)
- set logging server (Section 10.2.1.3)
- clear logging server (Section 10.2.1.4)
- show logging default (Section 10.2.1.5)
- set logging default (Section 10.2.1.6)
- clear logging default (Section 10.2.1.7)
- show logging application (Section 10.2.1.8)
- set logging application (Section 10.2.1.9)
- clear logging application (Section 10.2.1.10)
- show logging local (Section 10.2.1.11)
- set logging local (Section 10.2.1.12)
- clear logging local (Section 10.2.1.13)
- set logging here (Section 10.2.1.14)
- clear logging here (Section 10.2.1.15)
- show logging buffer (Section 10.2.1.16)

10.2.1.1 show logging all

Use this command to display all configuration information for system logging.

show logging all

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display all system logging information:

```
Matrix(rw)->show logging all
        Application   Current Severity Level Server List
-----------------------------------------------------------
 88     RtrAcl                    6              1-8
 89     CLI                       6              1-8
 90     SNMP                      6              1-8
 91     Webview                   6              1-8
 93     System                    6              1-8
 95     RtrFe                     6              1-8
 96     Trace                     6              1-8
 105    RtrLSNat                  6              1-8
 111    FlowLimt                  6              1-8
 112    UPN                       6              1-8
 117    AAA                       6              1-8
 118    Router                    6              1-8
 140    AddrNtfy                  6              1-8
 141    OSPF                      6              1-8
 142    VRRP                      6              1-8
 145    RtrArpProc                6              1-8
 147    LACP                      6              1-8

1(emergencies)  2(alerts)       3(critical)
4(errors)       5(warnings)     6(notifications)
7(information)  8(debugging)

  IP Address       Facility Severity        Description       Port Status
-------------------------------------------------------------------------
 1 80.80.80.252    local7 debugging(8)      N-Series           514 enabled


Defaults:          local4 debugging(8)                         514


Syslog Console Logging enabled

Syslog File Logging disabled
```

Table 10-1 provides an explanation of the command output.

Table 10-1 show logging all Output Details

Output	What It Displays...
Application	A mnemonic abbreviation of the textual description for applications being logged.
Current Severity Level	Severity level (**1 - 8**) at which the server is logging messages for the listed application. For details on setting this value using the **set logging application** command, refer to Section 10.2.1.9.
Defaults	Default facility name, severity level and UDP port designation (as described below.) For details on setting this value using the **set logging defaults** command, refer to Section 10.2.1.6.
IP Address	Syslog server's IP address. For details on setting this using the **set logging server** command, refer to Section 10.2.1.3.
Facility	Syslog facility that will be encoded in messages sent to this server. Valid values are: **local0** to **local7**.
Severity	Severity level at which the server is logging messages.
Description	Text string description of this facility/server.
Port	UDP port the client uses to send to the server.
Status	Whether or not this Syslog configuration is currently enabled or disabled.

10.2.1.2 show logging server

Use this command to display the Syslog configuration for a particular server.

show logging server [*index*]

Syntax Description

index	(Optional) Displays Syslog information pertaining to a specific server table entry. Valid values are **1**-**8**.

Command Defaults

If *index* is not specified, all Syslog server information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display Syslog server configuration information. For an explanation of the command output, refer back to Table 10-1.

```
Matrix(rw)->show logging server

IP Address       Facility Severity        Description       Port Status
-------------------------------------------------------------------------
 1 132.140.82.111 local4 warning(5)         default          514 enabled
 2 132.140.90.84  local4 warning(5)         default          514 enabled
```

10.2.1.3 set logging server

Use this command to configure a Syslog server.

set logging server *index* [**ip-addr** *ip-addr*] [**facility** *facility*] [**severity** *severity*] [**descr** *descr*] [**port** *port*] [**state** {**enable** | **disable**}]

Syntax Description

index	Specifies the server table index number for this server. Valid values are **1** - **8**.
ip-addr *ip-addr*	(Optional) Specifies the Syslog message server's IP address.
facility *facility*	(Optional) Specifies the server's facility name. Valid values are: **local0** to **local7**.
severity *severity*	(Optional) Specifies the severity level at which the server will log messages. Valid values and corresponding levels are: **1 -** emergencies (system is unusable) **2 -** alerts (immediate action required) **3 -** critical conditions **4 -** error conditions **5 -** warning conditions **6 -** notifications (significant conditions) **7 -** informational messages **8 -** debugging messages
descr *descr*	(Optional) Specifies a textual string description of this facility/server.
port *port*	(Optional) Specifies the default UDP port the client uses to send to the server.
state enable | **disable**	(Optional) Enables or disables this facility/server configuration.

Command Defaults

- If **ip-addr** is not specified, an entry in the Syslog server table will be created with the specified *index* number and a message will display indicating that no IP address has been assigned.
- If not specified, **facility**, severity and port will be set to defaults configured with the s**et logging default** command (Section 10.2.1.6.).
- If **state** is not specified, the server will not be enabled or disabled.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This command shows how to enable a Syslog server configuration for index 1, IP address 134.141.89.113, facility local4, severity level 3 on port 514:

```
Matrix(rw)->set logging server 1 ip-addr 134.141.89.113 facility local4
severity 3 port 514 state enable
```

10.2.1.4 clear logging server

Use this command to remove a server from the Syslog server table.

clear logging server *index*

Syntax Description

index	Specifies the server table index number for the server to be removed. Valid values are **1** - **8**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This command shows how to remove the Syslog server with index 1 from the server table:

```
Matrix(rw)->clear logging server 1
```

10.2.1.5 show logging default

Use this command to display the Syslog server default values.

show logging default

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This command shows how to display the Syslog server default values. For an explanation of the command output, refer back to Table 10-1.

```
Matrix(rw)->show logging default

              Facility      Severity          Port
            ----------------------------------------
Defaults:     local4       warning(5)       514
```

10.2.1.6 set logging default

Use this command to set logging default values.

set logging default {[**facility** *facility*] [**severity** *severity*] **port** *port*]}

Syntax Description

facility *facility*	Specifies the default facility name. Valid values are: **local0** to **local7**.
severity *severity*	Specifies the default logging severity level. Valid values and corresponding levels are: **1 -** emergencies (system is unusable) **2 -** alerts (immediate action required) **3 -** critical conditions **4 -** error conditions **5 -** warning conditions **6 -** notifications (significant conditions) **7 -** informational messages **8 -** debugging messages
port *port*	Specifies the default UDP port the client uses to send to the server.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the Syslog default facility name to local2 and the severity level to 4 (error logging):

```
Matrix(rw)->set logging default facility local2 severity 4
```

10.2.1.7 clear logging default

Use this command to reset logging default values.

clear logging default {[**facility**] [**severity**] [**port**]}

Syntax Description

facility	(Optional) Resets the default facility name to **local4**.
severity	(Optional) Resets the default logging severity level to **6** (notifications of significant conditions).
port	(Optional) Resets the default UDP port the client uses to send to the server to **514**.

Command Defaults

- At least one optional parameter must be entered.
- All three optional keywords must be entered to reset all logging values to defaults.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the Syslog default severity level to 6:

```
Matrix(rw)->clear logging default severity
```

10.2.1.8 show logging application

Use this command to display the severity level of Syslog messages for one or all applications configured for logging on your system.

show logging application [*mnemonic* | **all**]

Syntax Description

mnemonic | **all**	(Optional) Displays severity level for one or all applications configured for logging. Mnemonics will vary depending on the number and types of applications running on your system. To display a complete list, use the **show logging application** command as described in Section 10.2.1.8. Sample values and their corresponding applications are listed in Table 10-3.

NOTE: Mnemonic values are case sensitive and must be typed as they appear in Table 10-3.

Command Defaults

If not specified, information for all applications will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display system logging information pertaining to the all supported applications.

```
Matrix(su)->show logging application

       Application   Current Severity Level Server List
-------------------------------------------------------------
 88     RtrAcl                    6              1-8
 89     CLI                       6              1-8
 90     SNMP                      6              1-8
 91     Webview                   6              1-8
 93     System                    6              1-8
 95     RtrFe                     6              1-8
 96     Trace                     6              1-8
 105    RtrLSNat                  6              1-8
 111    FlowLimt                  6              1-8
 112    UPN                       6              1-8
 117    AAA                       6              1-8
 118    Router                    6              1-8
 140    AddrNtfy                  6              1-8
 141    OSPF                      6              1-8
 142    VRRP                      6              1-8
 145    RtrArpProc                6              1-8
 147    LACP                      6              1-8

1(emergencies)  2(alerts)       3(critical)
4(errors)       5(warnings)     6(notifications)
7(information)  8(debugging)
```

This example shows how to display system logging information pertaining to the SNMP application.

```
Matrix(rw)->show logging application SNMP

        Application   Current Severity Level Server List
-------------------------------------------------------------
 90     SNMP                      6              1-8

1(emergencies)  2(alerts)       3(critical)
4(errors)       5(warnings)     6(notifications)
7(information)  8(debugging)
```

Table 10-2 provides an explanation of the command output.

Table 10-2 show logging application Output Details

Output	What It Displays...
Application	A mnemonic abbreviation of the textual description for applications being logged.
Current Severity Level	Severity level at which the server is logging messages for the listed application. This range (from 1 to 8) and its associated severity list is shown in the CLI output. For a description of these entries, which are set using the **set logging application** command, refer to Section 10.2.1.9.
Server List	Servers to which log messages are being sent.

10.2.1.9 set logging application

Use this command to set the severity level of log messages and the server(s) to which messages will be sent for one or all applications.

set logging application {[*mnemonic* | **all**]} [**level** *level*] [**servers** *servers*]

Syntax Description

mnemonic	Specifies a case sensitive mnemonic abbreviation of an application to be logged. This parameter will vary depending on the number and types of applications running on your system. To display a complete list, use the **show logging application** command as described in Section 10.2.1.8. Sample values and their corresponding applications are listed in Table 10-3.
all	Sets the logging severity level for all applications.
level *level*	(Optional) Specifies the severity level at which the server will log messages for applications. Valid values and corresponding levels are: **1 -** emergencies (system is unusable) **2 -** alerts (immediate action required) **3 -** critical conditions **4 -** error conditions **5 -** warning conditions **6 -** notifications (significant conditions) **7 -** informational messages **8 -** debugging messages
servers *servers*	(Optional) Specifies index number(s) of the Syslog server(s) to which messages will be sent. Valid values are **1 - 8** and are set using the **set logging server** command (Section 10.2.1.3).

NOTE: Mnemonic values are case sensitive and must be typed as they appear in Table 10-3.

Table 10-3 Sample Mnemonic Values for Logging Applications

Mnemonic	Application
AAA	Authentication, Authorization, & Accounting
AddrNtfy	Address Add and Move Notification
CLI	Command Line Interface
FlowLimit	Flow Limiting
LACP	Link Aggregation Control Protocol
OSPF	Open Shortest Path First Routing Protocol
Router	Router
RtrAcl	Router Access Control List
RtrFE	Router Forwarding Engine
RtrArpProc	Router Arp Process
RtrLSNat	Router Load Sharing Network Address Translation
SNMP	Simple Network Management Protocol
System	Non-Application items such as general blade/chassis/configurations, etc.
Trace	Router Tracing
UPN	User Personalized Networking
VRRP	Virtual Router Redundancy Protocol
Webview	Webview Device Management

Command Defaults

- If **level** is not specified, none will be applied.
- If **server** is not specified, messages will be sent to all Syslog servers.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the severity level for SSH (Secure Shell) to 4 so that error conditions will be logged for that application and sent to Syslog server 1:

```
Matrix(rw)->set logging application SSH level 4 server 1
```

10.2.1.10 clear logging application

Use this command to reset the logging severity level for one or all applications to the default value of 6 (notifications of significant conditions).

clear logging application {*mnemonic* | **all**}

Syntax Description

mnemonic | **all**	(Optional) Resets the severity level for a specific application or for all applications. Valid mnemonic values and their corresponding applications are listed in Table 10-3.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the logging severity level for SSH:

```
Matrix(rw)->clear logging application SSH
```

10.2.1.11 show logging local

Use this command to display the state of message logging to the console and a persistent file.

show logging local

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the state of message logging. In this case, logging to the console is enabled and logging to a persistent file is disabled.

```
Matrix(rw)->show logging local
Syslog Console Logging enabled
Syslog File Logging disabled
```

10.2.1.12 set logging local

Use this command to configure log messages to the console and a persistent file.

set logging local console {**enable** | **disable**} **file** {**enable** | **disable**}

Syntax Description

console enable | **disable**	Enables or disables logging to the console.
file enable | **disable**	Enables or disables logging to a persistent file.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This command shows how to enable logging to the console and disable logging to a persistent file:

```
Matrix(rw)->set logging local console enable file disable
```

10.2.1.13 clear logging local

Use this command to clear the console and persistent store logging for the local session.

clear logging local

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear local logging:

```
Matrix(rw)->clear logging local
```

10.2.1.14 set logging here

Use this command to enable or disable the current CLI session as a Syslog destination. The effect of this command will be temporary if the current CLI session is using Telnet or SSH, but persistent on the console.

set logging here {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables display of logging messages for the current CLI session.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This command shows how to enable the display of logging messages to the current CLI session:

```
Matrix(rw)->set logging here enable
```

10.2.1.15 clear logging here

Use this command to clear the logging state for the current CLI session.

clear logging here

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This command shows how to clear the logging state for the current CLI session:

```
Matrix(rw)->clear logging here
```

10.2.1.16 show logging buffer

Use this command to display the last 256 messages logged.

show logging buffer

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows a portion of the information displayed with the **show logging buffer** command

```
Matrix(rw)->show logging buffer
<165>Sep  4 07:43:09 10.42.71.13 CLI[5]User:rw logged in from 10.2.1.122
(telnet)
<165>Sep  4 07:43:24 10.42.71.13 CLI[5]User: debug failed login from 10.4.1.100
(telnet)
```

10.2.2 Monitoring Network Events and Status

Purpose

To display switch events and command history, to set the size of the history buffer, and to display and disconnect current user sessions.

Commands

Commands to monitor switch network events and status are listed below and described in the associated section as shown.

- history (Section 10.2.2.1)
- show history (Section 10.2.2.2)
- set history (Section 10.2.2.3)
- show netstat (Section 10.2.2.4)
- ping (Section 10.2.2.5)
- show users (Section 10.2.2.6)
- tell (Section 10.2.2.7)
- disconnect (Section 10.2.2.8)

10.2.2.1 history

Use this command to display the contents of the command history buffer. The command history buffer includes all the switch commands entered up to a maximum of 50, as specified in the **set history** command (Section 10.2.2.3).

history

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the contents of the command history buffer. It shows there are five commands in the buffer:

```
Matrix(rw)->history
 1 hist
 2 show gvrp
 3 show vlan
 4 show igmp
 5 show ip address
```

10.2.2.2 show history

Use this command to display the size (in lines) of the history buffer.

show history

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the size of the history buffer:

```
Matrix(rw)->show history
 History buffer size: 20
```

10.2.2.3 set history

Use this command to set the size of the history buffer.

set history *size* [**default**]

Syntax Description

size	Specifies the size of the history buffer in lines. Valid values are **1** to **100**.
default	(Optional) Makes this setting persist for all future sessions.

Command Defaults

If **default** is not specified, the history setting will not be persistent.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the size of the command history buffer to 3 lines and make this the default setting:

```
Matrix(rw)->set history 3 default
```

10.2.2.4 show netstat

Use this command to display statistics for the switch's active network connections.

show netstat [icmp | ip | routes | stats | tcp | udp]

Syntax Description

icmp	(Optional) Shows Internet Control Message Protocol (ICMP) statistics.
ip	(Optional) Shows Internet Protocol (IP) statistics.
routes	(Optional) Shows the IP routing table.
stats	(Optional) Shows all statistics for TCP, UDP, IP, and ICMP.
tcp	(Optional) Shows Transmission Control Protocol (TCP) statistics.
udp	(Optional) Shows User Datagram Protocol (UDP) statistics.

Command Defaults

If no parameters are specified, **show netstat** will be executed as shown in the example below.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display statistics for all the current active network connections:

```
Matrix(rw)->show netstat
Active Internet connections (including servers)
PCB      Proto Recv-Q Send-Q  Local Address      Foreign Address    (state)
-------- ----- ------ ------  ------------------ ------------------ -------
1cc6314  TCP        0      0  0.0.0.0.80         0.0.0.0.0          LISTEN
1cc6104  TCP        0      0  0.0.0.0.23         0.0.0.0.0          LISTEN
1cc6290  UDP        0      0  0.0.0.0.162        0.0.0.0.0
1cc620c  UDP        0      0  0.0.0.0.161        0.0.0.0.0
```

Table 10-4 provides an explanation of the command output.

Table 10-4 show netstat Output Details

Output	What It Displays...
PCB	Protocol Control Block designation.
Proto	Type of protocol running on the connection.
Recv-Q	Number of queries received over the connection.
Send-Q	Number of queries sent over the connection.
Local Address	IP address of the connection's local host.
Foreign Address	IP address of the connection's foreign host.
(state)	Communications mode of the connection (listening, learning or forwarding).

10.2.2.5 ping

Use this command to send ICMP echo-request packets to another node on the network from the switch CLI.

ping [**-s**] *host* [*count*]

Syntax Description

-s	(Optional) Causes a continuous ping, sending one datagram per second and printing one line of output for every response received, until the user enters Ctrl+C.
host	Specifies the IP address of the device to which the **ping** will be sent.
count	(Optional) Specifies the number of packets to send. Valid values are from **1** to **2147483647**.

Command Defaults

- If **-s** is not specified, the ping will not be continuous.
- If not specified, packet *count* will be 1.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to ping IP address 134.141.89.29. In this case, this host is alive:

```
Matrix(rw)->ping 134.141.89.29
134.141.89.29 is alive
```

In this example, the host at IP address is not responding:

```
Matrix(rw)->ping 134.141.89.255
no answer from 134.141.89.255
```

This example shows how to ping IP address 134.141.89.29 with 10 packets:

```
Matrix(rw)->ping 134.141.89.29 10
PING 134.141.89.29: 56 data bytes
64 bytes from 134.141.89.29: icmp-seq=0. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=1. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=2. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=3. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=4. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=5. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=6. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=7. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=8. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=9. time=0. ms ----134.141.89.29 PING Sta-
tistics---- 10 packets transmitted, 10 packets received, 0% packet loss
round-trip (ms)  min/avg/max = 0/0/0
```

This example shows a continuous ping of IP address 134.141.89.29. In this case, entering Ctrl+C after 9 iterations caused command execution to stop:

```
Matrix(rw)->ping -s 134.141.89.29
PING 134.141.89.29: 56 data bytes
64 bytes from 134.141.89.29: icmp-seq=0. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=1. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=2. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=3. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=4. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=5. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=6. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=7. time=0. ms
64 bytes from 134.141.89.29: icmp-seq=8. time=0. ms ----134.141.89.29 PING Sta-
tistics---- 9 packets transmitted, 9 packets received, 0% packet loss
round-trip (ms)  min/avg/max = 0/0/0
```

10.2.2.6 show users

Use this command to display information about the active console port or Telnet session(s) logged in to the switch.

show users

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to use the **show users** command. In this output, there are two Telnet users logged in with Read-Write access privileges from IP addresses 134.141.192.119 and 134.141.192.18:

```
Matrix(rw)->show users
  Session  User  Location
  -------- ----- --------------------------
* telnet   rw    134.141.192.119
  telnet   rw    134.141.192.18
```

10.2.2.7 tell

Use this command to send a message to one or all users.

tell {*dest* | **all**} *message*

Syntax Description

dest	Specifies the user to which this message will be sent. Valid syntax is user@location.
all	Sends a broadcast message to all users.
message	Text message.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to tell all users about a system reset:

```
Matrix(rw)->tell all system reset scheduled for 1 p.m. today
```

10.2.2.8 disconnect

Use this command to close an active console port or Telnet session from the switch CLI.

disconnect {*ip-addr* | **console**}

Syntax Description

ip-addr	Specifies the IP address of the Telnet session to be disconnected. This address is displayed in the output shown in Section 10.2.2.6.
console	Closes an active console port.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to close a Telnet session to host 134.141.192.119:

```
Matrix(rw)->disconnect 134.141.192.119
```

This example shows how to close the current console session:

```
Matrix(rw)->disconnect console
```

10.2.3 Configuring SMON

Purpose

To configure SMON (Switched Network Monitoring) on the device.

Commands

Commands to configure SMON are listed below and described in the associated section as shown.

- show smon priority (Section 10.2.3.1)
- set smon priority (Section 10.2.3.2)
- clear smon priority (Section 10.2.3.3)
- show smon vlan (Section 10.2.3.4)
- set smon vlan (Section 10.2.3.5)
- clear smon vlan (Section 10.2.3.6)

10.2.3.1 show smon priority

Use this command to display SMON user priority statistics. SMON generates aggregated statistics for IEEE 802.1Q VLAN environments.

show smon priority [*port-string*] [**priority** *priority*]

Syntax Description

port-string	(Optional) Displays SMON priority statistics being collected by specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
priority *priority*	(Optional) Displays SMON statistics based on encoded user priority, Valid values are **0** - **7**.

Command Defaults

- If *port-string* is not specified, SMON statistics for all ports will be displayed.
- If *priority* is not specified, statistics for all priority queues will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SMON priority 0 statistics for 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->show smon priority ge.3.14 0
Show Priority Statistics
------------------------
Interface = ge.3.14
Owner     = none
Creation  = 0 days 0 hours 6 minutes 39 seconds
Status    = enabled
--------------------

Priority 0 Packets              Octets
----------
Total      7981308              2332402460
Overflow   0                    0
```

10.2.3.2 set smon priority

Use this command to create, start, or stop priority-encoded SMON user statistics counting.

set smon priority {create | enable | disable} *port-string* [*owner*]

Syntax Description

create | enable | disable	Creates, enables, or disables SMON priority statistics counting. Create automatically enables (starts) counters.
port-string	Specifies one or more source ports on which to collect statistics. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
owner	(Optional) Specifies an administratively assigned name of the owner of this entity.

Command Defaults

If *owner* is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how set the device to gather SMON priority statistics from 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->set smon priority ge.3.14
```

10.2.3.3 clear smon priority

Clears priority-encoded user statistics on one or more ports.

clear smon priority [*port-string*]

Syntax Description

port-string	(Optional) Clears statistics for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, priority statistics will be cleared on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how clear SMON priority statistics on 1-Gigabit Ethernet source port 14 in module 3:

```
Matrix(rw)->clear smon priority ge.3.14
```

10.2.3.4 show smon vlan

Use this command to display SMON (Switched Network Monitoring) VLAN statistics.

show smon vlan [*port-string*] [**vlan** *vlan-id*]

Syntax Description

port-string	(Optional) Displays SMON VLAN statistics being collected by specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
vlan *vlan-id*	(Optional) Displays SMON statistics associated with a specific VLAN.

Command Defaults

- If *port-string* is not specified, SMON statistics for all ports will be displayed.
- If *vlan-id* is not specified, statistics for all VLANs will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SMON VLAN 1 statistics for 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->show smon vlan ge.3.14 vlan 1
Show VLAN Statistics
--------------------
Interface = ge.3.14
Owner     = none
Creation  = 0 days 16 hours 4 minutes 34 seconds
Status    = enabled
--------------------

VLAN 1                Packets               Octets
Total                 8011072               2070785503
Overflow              0                     0
NonUnicast            0                     0
NonUnicast Overflow   0                     0
```

10.2.3.5 set smon vlan

Use this command to create, start, or stop SNMP VLAN-related statistics counting.

set smon vlan {create | enable | disable} *port-string* [*owner*]

Syntax Description

create | enable | disable	Creates, enables, or disables SMON VLAN statistics counting. Create automatically enables (starts) counters.
port-string	Specifies one or more source ports on which to collect statistics. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
owner	(Optional) Specifies an administratively assigned name of the owner of this entity.

Command Defaults

If *owner* is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how set the device to gather SMON VLAN-related statistics from 1-Gigabit Ethernet port 14 in module 3:

```
Matrix(rw)->set smon vlan ge.3.14
```

10.2.3.6 clear smon vlan

Use this command to delete an SMON VLAN statistics counting configuration.

clear smon vlan [*port-string*]

Syntax Description

port-string	(Optional) Clears statistics counting configuration(s) for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, VLAN statistics counting configurations will be cleared for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how clear an SMON VLAN statistics counting configuration from 1-Gigabit Ethernet source port 14 in module 3:

```
Matrix(rw)->clear smon vlan ge.3.14
```

10.2.4 Configuring RMON

RMON Monitoring Group Functions and Commands

RMON (Remote Network Monitoring) provides comprehensive network fault diagnosis, planning, and performance tuning information and allows for interoperability between SNMP management stations and monitoring agents. RMON extends the SNMP MIB capability by defining additional MIBs that generate a much richer set of data about network usage. These MIB "groups" each gather specific sets of data to meet common network monitoring requirements.

Table 10-5 lists the RMON monitoring groups supported on Matrix Series devices, each group's function and the elements it monitors, and the associated configuration commands needed.

Table 10-5 RMON Monitoring Group Functions and Commands

RMON Group	What It Does...	What It Monitors...	CLI Command(s)
Statistics	Records statistics measured by the RMON probe for each monitored interface on the device.	Packets dropped, packets sent, bytes sent (octets), broadcast and multicast packets, CRC errors, oversized and undersized packets, fragments, jabbers, and counters for packets.	show rmon stats (Section 10.2.4.1) set rmon stats (Section 10.2.4.2) clear rmon stats (Section 10.2.4.3)
History	Records periodic statistical samples from a network.	Sample period, number of samples and item(s) sampled.	show rmon history (Section 10.2.4.4) set rmon history (Section 10.2.4.5) clear rmon history (Section 10.2.4.6)

Table 10-5 RMON Monitoring Group Functions and Commands (Continued)

RMON Group	What It Does...	What It Monitors...	CLI Command(s)
Alarm	Periodically gathers statistical samples from variables in the probe and compares them with previously configured thresholds. If the monitored variable crosses a threshold, an event is generated.	Alarm type, interval, starting threshold, stop threshold.	show rmon alarm (Section 10.2.4.7) set rmon alarm properties (Section 10.2.4.8) set rmon alarm status (Section 10.2.4.9) clear rmon alarm (Section 10.2.4.10)
Event	Controls the generation and notification of events from the device.	Event type, description, last time event was sent.	show rmon event (Section 10.2.4.11) set rmon event properties (Section 10.2.4.12) set rmon event status (Section 10.2.4.13) clear rmon event (Section 10.2.4.14)
Host	Records statistics associated with each host discovered on the network.	Host address, packets and bytes received and transmitted, and broadcast, multicast and error packets.	show rmon host (Section 10.2.4.15) set rmon host properties (Section 10.2.4.16) set rmon host status (Section 10.2.4.17) clear rmon host (Section 10.2.4.18)

Table 10-5 RMON Monitoring Group Functions and Commands (Continued)

RMON Group	What It Does...	What It Monitors...	CLI Command(s)
Host TopN	Generates tables that describe hosts that top a list ordered by one of their statistics. These rate based statistics are samples of one of their base statistics over an interval specified by the management station.	Statistics, top host(s), sample stop and start period, rate base and duration.	show rmon topN (Section 10.2.4.19) set rmon topN properties (Section 10.2.4.20) set rmon topN status (Section 10.2.4.21) clear rmon topN (Section 10.2.4.22)
Matrix	Records statistics for conversations between two IP addresses. As the device detects a new conversation, it creates a new matrix entry.	Source and destination address pairs and packets, bytes and errors for each pair.	show rmon matrix (Section 10.2.4.23) set rmon matrix properties (Section 10.2.4.24) set rmon matrix status (Section 10.2.4.25) clear rmon matrix (Section 10.2.4.26)

Table 10-5 RMON Monitoring Group Functions and Commands (Continued)

RMON Group	What It Does...	What It Monitors...	CLI Command(s)
Filter	Allows packets to be matched by a filter equation. These matched packets form a data stream or "channel" that may be captured or may generate events.	Packets matching the filter configuration.	show rmon channel (Section 10.2.4.27) set rmon channel (Section 10.2.4.28) clear rmon channel (Section 10.2.4.29) show rmon filter (Section 10.2.4.30) set rmon filter (Section 10.2.4.31) clear rmon filter (Section 10.2.4.32)
Packet Capture	Allows packets to be captured upon a filter match.	Packets matching the filter configuration.	show rmon capture (Section 10.2.4.33) set rmon capture (Section 10.2.4.34) clear rmon capture (Section 10.2.4.35)

10.2.4.1 show rmon stats

Use this command to display RMON statistics measured for one or more ports.

show rmon stats [*port-string*] [**wide**] [**bysize**]

Syntax Description

port-string	(Optional) Displays RMON statistics for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
wide	(Optional) Display most important stats, one line per entry.
bysize	(Optional) Display counters by packet length.

Command Defaults

If *port-string* is not specified, RMON stats will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RMON statistics for Fast Ethernet port 20 in module 1:

```
Matrix(rw)->show rmon stats fe.1.20

Port: fe.1.20
--------------------
Index          = 1011
Owner          = monitor
Data Source    = 1.3.6.1.2.1.2.2.1.1.51021

Drop Events    = 0              Packets            = 0
Collisions     = 0              Octets             = 0
Jabbers        = 0              0    -   64 Octets = 0
Broadcast Pkts = 0              65   -  127 Octets = 0
Multicast Pkts = 0              128  -  255 Octets = 0
CRC Errors     = 0              256  -  511 Octets = 0
Undersize Pkts = 0              512  - 1023 Octets = 0
Oversize Pkts  = 0              1024 - 1518 Octets = 0
Fragments      = 0
```

Table 10-6 provides an explanation of the command output.

Table 10-6 show rmon stats Output Details

Output	What It Displays...
Port	Port designation.
Owner	Name of the entity that configured this entry. Monitor is default.
Data Source	Data source of the statistics being displayed.
Drop Events	Total number of times that the switch was forced to discard frames due to lack of available switch device resources. This does not display the number of frames dropped, only the number of times the switch was forced to discard frames.
Collisions	Total number of collisions that have occurred on this interface.
Jabbers	Total number of frames that were greater than 1518 bytes and had either a bad FCS or a bad CRC.
Packets	Total number of frames (including bad frames, broadcast frames, and multicast frames) received on this interface.
Broadcast Pkts	Total number of good frames that were directed to the broadcast address. This value does not include multicast frames.
Multicast Pkts	Total number of good frames that were directed to the multicast address. This value does not include broadcast frames.
CRC Errors	Number of frames with bad Cyclic Redundancy Checks (CRC) received from the network. The CRC is a 4-byte field in the data frame that ensures that the data received is the same as the data that was originally sent.
Undersize Pkts	Number of frames received containing less than the minimum Ethernet frame size of 64 bytes (not including the preamble) but having a valid CRC.
Oversize Pkts	Number of frames received that exceeded 1518 data bytes (not including the preamble) but had a valid CRC.

Table 10-6 show rmon stats Output Details (Continued)

Output	What It Displays...
Fragments	Number of received frames that are not the minimum number of bytes in length, or received frames that had a bad or missing Frame Check Sequence (FCS), were less than 64 bytes in length (excluding framing bits, but including FCS bytes) and had an invalid CRC. It is normal for this value to increment since fragments are a normal result of collisions in a half-duplex network.
Packets	Total number of packets, including bad, broadcast and multicast.
Octets	Total number of octets (bytes) of data, including those in bad frames, received on this interface.
0 – 64 Octets	Total number of frames, including bad frames, received that were 64 bytes in length (excluding framing bits, but including FCS bytes).
65 – 127 Octets	Total number of frames, including bad frames, received that were between 65 and 127 bytes in length (excluding framing bits, but including FCS bytes).
128 – 255 Octets	Total number of frames, including bad frames, received that were between 128 and 255 bytes in length (excluding framing bits, but including FCS bytes).
256 – 511 Octets	Total number of frames, including bad frames, received that were between 256 and 511 bytes in length (excluding framing bits, but including FCS bytes).
512 – 1023 Octets	Total number of frames, including bad frames, received that were between 512 and 1023 bytes in length (excluding framing bits, but including FCS bytes).
1024 – 1518 Octets	Total number of frames, including bad frames, received that were between 1024 and 1518 bytes in length (excluding framing bits, but including FCS bytes).

10.2.4.2 set rmon stats

Use this command to configure an RMON statistics entry.

set rmon stats *index port-string* [*owner*]

Syntax Description

index	Specifies an index for this statistics entry.
port-string	Specifies port(s) to which this entry will be assigned. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
owner	(Optional) Assigns an owner for this entry.

Command Defaults

If *owner* is not specified, **monitor** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure RMON statistics entry 2 for fe.1.20:

```
Matrix(rw)->set rmon stats 2 fe.1.20
```

10.2.4.3 clear rmon stats

Use this command to delete one or more RMON statistics entries.

clear rmon stats {*index-list* | **to-defaults**}

Syntax Description

index-list	Specifies one or more stats entries to be deleted, causing them to disappear from any future RMON queries.
to-defaults	Resets all history entries to default values. This will cause entries to reappear in RMON queries.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete RMON statistics entry 2:

```
Matrix(rw)->clear rmon stats 2
```

10.2.4.4 show rmon history

Use this command to display RMON history properties and statistics. The RMON history group records periodic statistical samples from a network.

show rmon history [*port-string*] [**wide**] [**interval**]

Syntax Description

port-string	(Optional) Displays RMON history entries for specific port(s).
wide	(Optional) Display most important stats, one line per entry.
interval	(Optional) Summarize history over a fixed interval.

Command Defaults

If *port-string* is not specified, information about all RMON history entries will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RMON history entries for Fast Ethernet port 14 in module 3. A control entry displays first, followed by actual entries corresponding to the control entry. In this case, the default settings for entry owner, sampling interval, and maximum number of entries. (buckets) have not been changed from their default values (as described in Section 10.2.4.5). For a description of the types of statistics shown, refer to Table 10-6:

```
Matrix(rw)->show rmon history fe.3.14
Port: fe.3.14
---------------------------------------
Index 1001
Status             = 1 valid
Owner              = monitor
Data Source        = 1.3.6.1.2.1.2.2.1.1.11001
Interval           = 30
Buckets Requested = 50
Buckets Granted    = 50

Sample 2304       Interval Start: 0 days 19 hours 11 minutes 35 seconds
Drop Events        = 0                     Undersize Pkts     = 0
Octets             = 0                     Oversize Pkts      = 0
Packets            = 0                     Fragments          = 0
Broadcast Pkts     = 0                     Jabbers            = 0
Multicast Pkts     = 0                     Collisions         = 0
CRC Align Errors   = 0                     Utilization(%)     = 0
```

10.2.4.5 set rmon history

Use this command to configure an RMON history entry.

set rmon history *index* [*port-string*] [**buckets** *buckets*] [**interval** *interval*] [**owner** *owner*]

Syntax Description

index-list	Specifies an index number for this entry.
port-string	(Optional) Assigns this entry to a specific port.
buckets *buckets*	(Optional) Specifies the maximum number of entries to maintain.
interval *interval*	(Optional) Specifies the sampling interval in seconds.
owner *owner*	(Optional) Specifies an owner for this entry.

Command Defaults

- If *buckets* is not specified, the maximum number of entries maintained will be 50.
- If not specified, *interval* will be set to 30 seconds.
- If *owner* is not specified, **monitor** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how configure RMON history entry 1 on port fe.2.1 to sample every 30 seconds:

```
Matrix(rw)->set rmon history 1 fe.2.1 interval 20
```

10.2.4.6 clear rmon history

Use this command to delete one or more RMON history entries or reset one or more entries to default values. For specific values, refer to Section 10.2.4.5.

clear rmon history {*index-list* | **to-defaults**}

Syntax Description

index-list	Specifies one or more history entries to be deleted, causing them to disappear from any future RMON queries.
to-defaults	Resets all history entries to default values. This will cause entries to reappear in RMON queries.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete RMON history entry 1:

```
Matrix(rw)->clear rmon history 1
```

10.2.4.7 show rmon alarm

Use this command to display RMON alarm entries. The RMON alarm group periodically takes statistical samples from RMON variables and compares them with previously configured thresholds. If the monitored variable crosses a threshold an RMON event is generated.

show rmon alarm [*index*]

Syntax Description

index	(Optional) Displays RMON alarm entries for a specific entry index ID.

Command Defaults

If *index* is not specified, information about all RMON alarm entries will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RMON alarm entry 3:

```
Matrix(rw)->show rmon alarm 3

Index 3
---------------------
Owner               = Manager
Status              = valid
Variable            = 1.3.6.1.4.1.5624.1.2.29.1.2.1.0
Sample Type         = delta          Startup Alarm       = rising
Interval            = 30             Value               = 0
Rising Threshold    = 1              Falling Threshold   = 0
Rising Event Index  = 2              Falling Event Index = 0
```

Table 10-7 provides an explanation of the command output.

Table 10-7 show rmon alarm Output Details

Output	What It Displays...
Index	Index number for this alarm entry.
Owner	Text string identifying who configured this entry.
Status	Whether this event entry is enabled (valid) or disabled.
Variable	MIB object to be monitored.
Sample Type	Whether the monitoring method is an absolute or a delta sampling.
Startup Alarm	Whether alarm generated when this entry is first enabled is rising, falling, or either.
Interval	Interval in seconds at which RMON will conduct sample monitoring.
Rising Threshold	Minimum threshold for causing a rising alarm.
Falling Threshold	Maximum threshold for causing a falling alarm.
Rising Event Index	Index number of the RMON event to be triggered when the rising threshold is crossed.
Falling Event Index	Index number of the RMON event to be triggered when the falling threshold is crossed.

10.2.4.8 set rmon alarm properties

Use this command to configure an RMON alarm entry, or to create a new alarm entry with an unused alarm index number.

set rmon alarm properties *index* [**interval** *interval*] [**object** *object*] [**type {absolute** | **delta}**] **[startup {rising** | **falling** | **either}**] [**rthresh** *rthresh*] [**fthresh** *fthresh*] [**revent** *revent*] [**fevent** *fevent*] [**owner** *owner*]

Syntax Description

index	Specifies an index number for this entry. Maximum number or entries is 50**.** Maximum value is **65535**.
interval *interval*	(Optional) Specifies an interval (in seconds) for RMON to conduct sample monitoring.
object *object*	(Optional) Specifies a MIB object to be monitored. **NOTE:** This parameter is not mandatory for executing the command, but must be specified in order to enable the alarm entry configuration.
type absolute | **delta**	(Optional) Specifies the monitoring method as: sampling the absolute value of the object, or the difference (delta) between object samples.
startup rising | **falling** | **either**	(Optional) Specifies the type of alarm generated when this event is first enabled as: • Rising - Sends alarm when an RMON event reaches a maximum threshold condition is reached, for example, more than 30 collisions per second. • Falling - Sends alarm when RMON event falls below a minimum threshold condition, for example when the network is behaving normally again. • Either - Sends alarm when either a rising or falling threshold is reached.
rthresh *rthresh*	(Optional) Specifies a minimum threshold for causing a rising alarm.
fthresh *fthresh*	Specifies a maximum threshold for causing a falling alarm.

revent *revent*	Specifies the index number of the RMON event to be triggered when the rising threshold is crossed.
fevent *fevent*	Specifies the index number of the RMON event to be triggered when the falling threshold is crossed.
owner *owner*	(Optional) Specifies the name of the entity that configured this alarm entry.

Command Defaults

- interval - **3600** seconds
- type - **absolute**
- startup - **rising**
- rthresh - **0**
- fthresh - **0**
- revent - **0**
- fevent - **0**
- owner - **monitor**

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure a rising RMON alarm. This entry will conduct monitoring of the delta between samples every 30 seconds:

```
Matrix(rw)->set rmon alarm properties 3 interval 30 object
   1.3.6.1.4.1.5624.1.2.29.1.2.1.0 type delta rthresh 1 revent 2 owner Manager
```

10.2.4.9 set rmon alarm status

Use this command to enable an RMON alarm entry. An alarm is a notification that a statistical sample of a monitored variable has crossed a configured threshold.

set rmon alarm status *index* **enable**

NOTE: An RMON alarm entry can be created using this command, configured using the **set rmon alarm properties** command (Section 10.2.4.8), then enabled using this command. An RMON alarm entry can be created and configured at the same time by specifying an unused index with the set properties command.

Syntax Description

index	Specifies an index number for this entry. Maximum number or entries is 50**.** Maximum value is **65535**.
enable	Enables this alarm entry.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable RMON alarm entry 3:

```
Matrix(rw)->set rmon alarm status 3 enable
```

10.2.4.10 clear rmon alarm

Use this command to delete an RMON alarm entry.

clear rmon alarm *index*

Syntax Description

index	Specifies the index number of entry to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear RMON alarm entry 1:

```
Matrix(rw)->clear rmon alarm 1
```

10.2.4.11 show rmon event

Use this command to display RMON event entry properties.

show rmon event [*index*]

Syntax Description

index	(Optional) Displays RMON properties and log entries for a specific entry index ID.

Command Defaults

If *index* is not specified, information about all RMON entries will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RMON event entry 3:

```
Matrix(rw)->show rmon event 3

Index 3
----------------
Owner          = Manager
Status         = valid
Description    = STP Topology change
Type           = log-and-trap
Community      = public
Last Time Sent = 0 days 0 hours 0 minutes 37 seconds
```

Table 10-8 provides an explanation of the command output.

Table 10-8 show rmon event Output Details

Output	What It Displays...
Index	Index number for this event entry.
Owner	Text string identifying who configured this entry.
Status	Whether this event entry is enabled (valid) or disabled.

Table 10-8 show rmon event Output Details (Continued)

Output	What It Displays...
Description	Text string description of this event.
Type	Whether the event notification will be a log entry, and SNMP trap, both, or none.
Community	SNMP community name if message type is set to trap.
Last Time Sent	When an event notification matching this entry was sent.

10.2.4.12 set rmon event properties

Use this command to configure an RMON event entry, or to create a new event entry with an unused event index number.

set rmon event properties *index* [**description** *description*] [**type {none** | **log** | **trap** | **both}**] [**community** *community*] [**owner** *owner*]

Syntax Description

index	Specifies an index number for this entry. Maximum number of entries is 100. Maximum value is **65535**.
description *description*	(Optional) Specifies a text string description of this event.
type none | **log** | **trap** | **both**	(Optional) Specifies the type of RMON event notification as: none, a log table entry, an SNMP trap, or both a log entry and a trap message.
community *community*	(Optional) Specifies an SNMP community name to use if the message type is set to **trap**. For details on setting SNMP traps and community names, refer to Section 4.3.6.
owner *owner*	(Optional) Specifies the name of the entity that configured this entry.

Command Defaults

- If **description** is not specified, none will be applied.
- If not specified, **type none** will be applied.
- If *owner* is not specified, **monitor** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create and enable an RMON event entry called “STP topology change” that will send both a log entry and an SNMP trap message to the “public” community:

```
Matrix(rw)->set rmon event properties 2 description "STP topology change" type
both community public owner Manager
```

10.2.4.13 set rmon event status

Use this command to enable an RMON event entry. An event entry describes the parameters of an RMON event that can be triggered. Events can be fired by RMON alarms and can be configured to create a log entry, generate a trap, or both.

set rmon event status *index* **enable**

NOTE: An RMON event entry can be created using this command, configured using the **set rmon event properties** command (Section 10.2.4.12), then enabled using this command. An RMON event entry can be created and configured at the same time by specifying an unused index with the set properties command.

Syntax Description

index	Specifies an index number for this entry. Maximum number of entries is 100. Maximum value is **65535**.
enable	Enables this event entry.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable RMON event entry 1:

```
Matrix(rw)->set rmon event status 1 enable
```

10.2.4.14 clear rmon event

Use this command to delete an RMON event entry and any associated log entries.

clear rmon event *index*

Syntax Description

index	Specifies the index number of the entry to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear RMON event 1:

```
Matrix(rw)->clear rmon event 1
```

10.2.4.15 show rmon host

Use this command to display RMON properties and statistics associated with each host discovered on the network.

show rmon host [*port-string*] [**address** | **creation**]

Syntax Description

port-string	(Optional) Displays RMON properties and statistics for specific port(s).
address | **creation**	(Optional) Sorts the display by MAC address or creation time of the entry.

Command Defaults

- If *port-string* is not specified, information about all ports will be displayed.
- If **address** or **creation** are not specified, entries will not be sorted.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RMON host properties and statistics. A control entry displays first, followed by actual entries corresponding to the control entry. For a description of the types of statistics shown, refer to Table 10-6:

```
Matrix(rw)->show rmon host

------------------
Host Index     1
Interface      21009
Table size     100
Last deletion 766048
Status         1
Owner          monitor

Host 00-00-5e-00-01-01   Creation Order 22
In Pkts         0
Out Pkts        1
In Octets       0
Out Octets      66
Broadcast Pkts 0
Multicast Pkts 0

Host 00-00-f6-00-86-6d   Creation Order 74
In Pkts         0
Out Pkts        2
In Octets       0
Out Octets      136
Broadcast Pkts 0
Multicast Pkts 0
```

10.2.4.16 set rmon host properties

Use this command to configure an RMON host entry.

set rmon host properties *index port-string* [*owner*]

Syntax Description

index	Specifies an index number for this entry. An entry will automatically be created if an unused index number is chosen. Maximum number of entries is 5. Maximum value is **65535**.
port-string	Configures RMON host monitoring on a specific port.
owner	(Optional) Specifies the name of the entity that configured this entry.

Command Defaults

If *owner* is not specified, **monitor** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure RMON host entry 1 on Fast Ethernet port 5 in module 1:

```
Matrix(rw)->set rmon host properties 1 fe.1.5
```

10.2.4.17 set rmon host status

Use this command to enable an RMON host entry.

set rmon host status *index* **enable**

Syntax Description

index	Specifies an index number for this entry. Maximum number of entries is 5. Maximum value is **65535**.
enable	Enables this host entry.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable RMON host entry 1:

```
Matrix(rw)->set rmon host status 1 enable
```

10.2.4.18 clear rmon host

Use this command to delete an RMON host entry.

clear rmon host *index*

Syntax Description

index	Specifies the index number of the entry to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear RMON host entry 1:

```
Matrix(rw)->clear rmon host 1
```

10.2.4.19 show rmon topN

Use this command to displays RMON TopN properties and statistics. TopN monitoring prepares tables that describe the hosts topping a list ordered by one of their statistics. TopN lists are samples of one of the hosts base statistics over a specific interval.

set rmon topN [*index*]

Syntax Description

index	(Optional) Displays RMON properties and statistics for a specific entry index ID.

Command Defaults

If *index* is not specified, information about all entries will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display all RMON TopN properties and statistics. A control entry displays first, followed by actual entries corresponding to the control entry:

```
Matrix(rw)->show rmon topN

--------------------
Index          = 1
Status         = 1 valid
Owner          = monitor
Start Time     = 0
HostIndex      = 1
Rate Base      = 1 InPkts
Duration       = 10
Time Remaining = 0
Requested Size = 10000
Granted Size   = 100

Report 1
-------------------
Rate = 3
Address = 0.1.f4.6.2e.40
```

Table 10-9 provides an explanation of the command output. Properties are set using the **set rmon topN properties** command as described in Section 10.2.4.20.

Table 10-9 show rmon topN Output Details

Output	What It Displays...
Index	Index number for this event entry. Each entry defines one top N report prepared for one interface.
Status	Whether this event entry is enabled (valid) or disabled.
Owner	Text string identifying who configured this entry.
Start Time	System up time when this report was last started.
HostIndex	Index number of the host table for which this top N report will be prepared.
Rate Base	Type of counter (and corresponding integer value) activated with this entry: as InPackets (1), OutPackets (2), InOctets (3), OutOctets (4), OutErrors (5), Broadcast packets (6), or Multicast packets (7).
Duration	Collection time (in seconds) for this report.
Time Remaining	Collection time left for this report if still in progress.
Requested Size	Maximum number of hosts requested for the top N table.
Granted Size	Actual maximum number of hosts in the top N table. Depending on system resources, this may differ from the Requested Size value.
Rate	Amount of change in the counter type (InPackets, OutPackets, etc.) during the sampling interval.
Address	MAC address of the host.

10.2.4.20 set rmon topN properties

Use this command to configure an RMON topN entry (report).

set rmon topn properties *index* [**hindex** *hindex*] [**rate** {**inpackets** | **outpackets** | **inoctets** | **outoctets** | **errors** | **bcast** | **mcast**}] [**duration** *duration*] [**size** *size*] [**owner** *owner*]

Syntax Description

index	Specifies an index number for this entry. An entry will automatically be created if an unused index number is chosen. Maximum number of entries is 10. Maximum value is **65535**.
hindex *hindex*	(Optional) Specifies an index number of the host table.
rate inpackets | **outpackets** | **inoctets** | **outoctets** | **errors** | **bcast** | **mcast**	(Optional) Specifies the type of counter to activate with this entry as InPackets, OutPackets, InOctets, OutOctets, OutErrors, Broadcast packets, or Multicast packets.
duration *duration*	(Optional) Specifies the sampling interval in seconds. Value must be a minimum of **60**.
size *size*	(Optional) Specifies the maximum number of entries to maintain.
owner *owner*	(Optional) Specifies the name of the entity that configured this entry.

Command Defaults

- If host index is not specified, none will be applied.
- If counter type is not specified, **inpackets** will be applied.
- If *duration* is not specified, none will be applied.
- If *size* is not specified, **10** will be applied.
- If *owner* is not specified, **monitor** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure RMON TopN entry 1, for host 1 with a sampling interval of 60 seconds and a maximum number of entries of 20:

```
Matrix(rw)->set rmon topN properties 1 1 inpackets 60 20
```

10.2.4.21 set rmon topN status

Use this command to enable an RMON topN entry.

set rmon topN status *index* **enable** |

Syntax Description

index	Specifies an index number for this entry. Maximum number of entries is 10. Maximum value is **65535**.
enable	Enables this TopN entry.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable RMON TopN entry 1:

```
Matrix(rw)->set rmon topN status 1 enable
```

10.2.4.22 clear rmon topN

Use this command to delete an RMON TopN entry.

clear rmon topN *index*

Syntax Description

index	Specifies the index number of the entry to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete RMON TopN entry 1:

```
Matrix(rw)->clear rmon topN 1
```

10.2.4.23 show rmon matrix

Use this command to display RMON matrix properties and statistics. The RMON matrix stores statistics for conversations between sets of two addresses.

show rmon matrix [*port-string*] [**source** | **dest**]

Syntax Description

port-string	(Optional) Displays RMON properties and statistics for a specific port(s).
source | **dest**	(Optional) Sorts the display by source or destination address.

Command Defaults

- If *port-string* is not specified, information about all ports will be displayed.
- If not specified, information about source and destination addresses will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RMON matrix properties and statistics. A control entry displays first, followed by actual entries corresponding to the control entry:

```
Matrix(rw)->show rmon matrix

------------------

Matrix Index    1
Interface       32009
Table size      100
Last deletion   116647
Status          1
Owner           monitor

Source      00-e0-63-9d-c1-c8    Destination 00-a0-c9-03-cd-7c
Packets   = 2                    Octets    = 286
Errors    = ---
```

Table 10-10 provides an explanation of the command output. Properties are set using the **set rmon matrix properties** command as described in Section 10.2.4.24.

Table 10-10 show rmon matrix Output Details

Output	What It Displays...
Matrix Index	Index number for this RMON matrix entry.
Interface	Interface for which host monitoring is being conducted.
Table size	Number of entries in the matrix table for this interface.
Last deletion	System up time when the last entry was deleted from the matrix table associated with this entry.
Status	Whether this matrix entry is enabled (valid) or disabled.
Owner	Text string identifying who configured this entry.
Source	Source of the data from which this entry creates a traffic matrix.
Destination	Destination of the data from which this entry creates a traffic matrix.
Packets	Number of packets (including bad packets) transmitted from the source address to the destination address.
Octets	Number of octets (excluding framing bits, but including FCS octets) contained in all packets transmitted from the source address to the destination address.
Errors	Errors recorded.

10.2.4.24 set rmon matrix properties

Use this command to configure an RMON matrix entry.

set rmon matrix properties *index port-string* [*owner*]

Syntax Description

index	Specifies an index number for this entry. An entry will automatically be created if an unused index number is chosen. Maximum number of entries is 2. Maximum value is **65535**.
port-string	Specifies port(s) on which to monitors statistics.
owner	(Optional) Specifies the name of the entity that configured this entry.

Command Defaults

If *owner* is not specified, **monitor** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure RMON matrix entry 1 for fe.1.1

```
Matrix(rw)->set rmon matrix properties 1 fe.1.1
```

10.2.4.25 set rmon matrix status

Use this command to enable an RMON matrix entry.

set rmon matrix status *index* **enable**

Syntax Description

index	Specifies an index number for this entry. Maximum number of entries is 2. Maximum value is **65535**.
enable	Enables or disables this matrix entry.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable RMON matrix entry 1:

```
Matrix(rw)->set rmon matrix status 1 enable
```

10.2.4.26 clear rmon matrix

Use this command to delete an RMON matrix entry.

clear rmon matrix *index*

Syntax Description

index	Specifies the index number of the entry to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete RMON matrix entry 1:

```
Matrix(rw)->clear rmon matrix 1
```

10.2.4.27 show rmon channel

Use this command to display RMON channel entries for one or more ports.

show rmon channel [*port-string*]

Syntax Description

port-string	(Optional) Displays RMON channel entries for a specific port(s).

Command Defaults

If *port-string* is not specified, information about all channels will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RMON channel information for fe.2.12:

```
Matrix(rw)->show rmon channel fe.2.12

Port fe.2.12    Channel index= 628      EntryStatus= valid
-------------------------------------------------------------
Control             off       AcceptType          matched
OnEventIndex        0         OffEventIndex       0
EventIndex          0         Status              ready
Matches             4498
Description         Thu Dec 16 12:57:32 EST 2004
Owner               NetSight smith
```

10.2.4.28 set rmon channel

Use this command to configure an RMON channel entry.

set rmon channel *index port-string* [**accept** {**matched** | **failed**}] [**control** {**on** | **off**}] [**onevent** *onevent*] [**offevent** *offevent*] [**event** *event*] [**estatus** {**ready** | **fired** | **always**}] [**description** *description*] [**owner** *owner*]

Syntax Description

index	Specifies an index number for this entry. An entry will automatically be created if an unused index number is chosen. Maximum number of entries is 2. Maximum value is **65535**.
port-string	Specifies the port on which traffic will be monitored.
accept matched | **failed**	(Optional) Specifies the action of the filters on this channel as: • **matched** - Packets will be accepted on filter matches • **failed** - Packets will be accepted if they fail a match
control on | **off**	(Optional) Enables or disables control of the flow of data through the channel.
onevent *onevent*	(Optional) Specifies the index of the RMON event that will turn this channel on.
offevent *offevent*	(Optional) Specifies the index of the RMON event that will turn this channel off.
event *event*	(Optional) Specifies the event to be triggered when the channel is on and a packet is accepted
estatus ready | **fired** | **always**	(Optional) Specifies the status of the event as: • **ready** - A single event may be generated. • **fired** - No additional events may be generated. • **always** - An event will be generated for every match.
description *description*	(Optional) Specifies a description for this channel.
owner	(Optional) Specifies the name of the entity that configured this entry.

Command Defaults

- If an **action** is not specified, packets will be accepted on filter matches.
- If not specified, **control** will be set to **off**.
- If **onevent** and **offevent** are not specified, none will be applied.
- If event status is not specified, **ready** will be applied.
- If a **description** is not specified, none will be applied.
- If *owner* is not specified, it will be set to **monitor**.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create an RMON channel entry:

```
Matrix(rw)->set rmon channel 54313 fe.2.12 accept failed control on description
"capture all"
```

10.2.4.29 clear rmon channel

Use this command to clear an RMON channel entry.

clear rmon channel *index*

Syntax Description

index	Specifies the channel entry to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear RMON channel entry 2:

```
Matrix(rw)->clear rmon channel 2
```

10.2.4.30 show rmon filter

Use this command to display one or more RMON filter entries.

show rmon filter [**index** *index* | **channel** *channel*]

Syntax Description

index *index* | **channel** *channel*	(Optional) Displays information about a specific filter entry, or about all filters which belong to a specific channel.

Command Defaults

If no options are specified, information for all filter entries will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display all RMON filter entries and channel information:

```
Matrix(rw)->show rmon filter

Index= 55508    Channel Index= 628      EntryStatus= valid
------------------------------------------------------------
Data Offset          0          PktStatus           0
PktStatusMask        0          PktStatusNotMask    0
Owner                ETS,NAC-D
-----------------------------
Data
ff ff ff ff ff ff
-----------------------------
DataMask
ff ff ff ff ff ff
-----------------------------
DataNotMask
00 00 00 00 00 00
```

10.2.4.31 set rmon filter

Use this command to configure an RMON filter entry.

set rmon filter *index channel_index* [**offset** *offset*] [**status** *status*] [**smask** *smask*] [**snotmask** *snotmask*] [**data** *data*] [**dmask** *dmask*] [**dnotmask** *dnotmask*] [**owner** *owner*]

Syntax Description

index	Specifies an index number for this entry. An entry will automatically be created if an unused index number is chosen. Maximum number of entries is 10. Maximum value is **65535**.
channel_index	Specifies the channel to which this filter will be applied.
offset *offset*	(Optional) Specifies an offset from the beginning of the packet to look for matches.
status *status*	(Optional) Specifies packet status bits that are to be matched.
smask *smask*	(Optional) Specifies the mask applied to status to indicate which bits are significant.
snotmask *snotmask*	(Optional) Specifies the inversion mask that indicates which bits should be set or not set
data *data*	(Optional) Specifies the data to be matched.
dmask *dmask*	(Optional) Specifies the mask applied to data to indicate which bits are significant.
dnotmask *dnotmask*	(Optional) Specifies the inversion mask that indicates which bits should be set or not set.
owner	(Optional) Specifies the name of the entity that configured this entry.

Command Defaults

- If *owner* is not specified, it will be set to **monitor**.
- If no other options are specified, none (0) will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create RMON filter 1 and apply it to channel 9:

```
Matrix(rw)->set rmon filter 1 10 offset 30 data 0a154305 dmask ffffffff
```

10.2.4.32 clear rmon filter

Use this command to clear an RMON filter entry.

clear rmon filter {**index** *index* | **channel** *channel*}

Syntax Description

index *index* | **channel** *channel*	Clears a specific filter entry, or all entries belonging to a specific channel.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear RMON filter entry 1:

```
Matrix(rw)->clear rmon filter index 1
```

10.2.4.33 show rmon capture

Use this command to display RMON capture entries and associated buffer control entries.

show rmon capture [*index*] [**nodata**]

Syntax Description

index	(Optional) Displays the specified buffer control entry and all captured packets associated with that entry.
nodata	(Optional) Displays only the buffer control entry specified by index.

Command Defaults

If no options are specified, all buffer control entries and associated captured packets will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RMON capture entries and associated buffer entries:

```
Matrix(rw)->show rmon capture

Buf.control= 28062  Channel= 38283      EntryStatus= valid
------------------------------------------------------------
FullStatus          avail     FullAction          lock
Captured packets    251       Capture slice       128
Download size       100       Download offset     0
Max Octet Requested 50000     Max Octet Granted   50000
Start time          1 days 0 hours 51 minutes 15 seconds
Owner               monitor


captureEntry= 1        Buff.control= 28062
-------------------------------------------
Pkt ID      9          Pkt time    1 days 0 hours 51 minutes 15 seconds
Pkt Length  93         Pkt status  0
Data:
00 00 5e 00 01 01 00 01 f4 00 7d ce 08 00 45 00
00 4b b4 b9 00 00 40 11 32 5c 0a 15 43 05 86 8d
bf e5 00 a1 0e 2b 00 37 cf ca 30 2d 02 01 00 04
06 70 75 62 6c 69 63 a2 20 02 02 0c 92 02 01 00
02 01 00 30 14 30 12 06 0d 2b 06 01 02 01 10 07
01 01 0b 81 fd 1c 02 01 01 00 11 0b 00
```

10.2.4.34 set rmon capture

Use this command to configure an RMON capture entry, or to enable or disable an existing entry.

set rmon capture *index* {*channel* [**action** {**lock** | **wrap**}] [**slice** *slice*] [**loadsize** *loadsize*] [**offset** *offset*] [**asksize** *asksize*] [**owner** *owner*]} | {**enable** | **disable**}

Syntax Description

index	Specifies a buffer control entry.
channel	Specifies the channel to which this capture entry will be applied.
action lock | **wrap**	(Optional) Specifies the action of the buffer when it is full as: • **lock** - Packets will cease to be accepted • **wrap** - Oldest packets will be overwritten
slice *slice*	(Optional) Specifies the maximum octets from each packet to be saved in a buffer. (default: 100)
loadsize *loadsize*	(Optional) Specifies the maximum octets from each packet to be downloaded from the buffer (default: 100)
offset *offset*	(Optional) Specifies that the first octet from each packet that will be retrieved.
asksize *asksize*	(Optional) Specifies that the requested maximum octets will be saved in this buffer.
owner	(Optional) Specifies the name of the entity that configured this entry.
enable | **disable**	Enables or disables an existing RMON capture entry.

Command Defaults

- If not specified, **action** defaults to **lock**.
- If not specified, offset defaults to **0**.
- If not specified, asksize defaults to **1** (which will request as many octets as possible)
- If **slice** and **loadsize** are not specified, **100** will be applied.
- If *owner* is not specified, it will be set to **monitor**.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create RMON capture entry 1 to “listen” on channel 628:

```
Matrix(rw)->set rmon capture 1 628
```

10.2.4.35 clear rmon capture

Use this command to clears an RMON capture entry.

clear rmon capture *index*

Syntax Description

index	Specifies the capture entry to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear RMON capture entry 1:

```
Matrix(rw)->clear rmon capture 1
```

10.2.5 Managing Switch Network Addresses and Routes

Purpose

To display, add or delete switch ARP table entries, to enable or disable RAD (Runtime Address Discovery) protocol, to display, add or delete IP routing table addresses, and to display MAC address information.

Commands

Commands to manage switch network addresses and routes are listed below and described in the associated section as shown.

- show arp (Section 10.2.5.1)
- set arp (Section 10.2.5.2)
- clear arp (Section 10.2.5.3)
- show rad (Section 10.2.5.4)
- set rad (Section 10.2.5.5)
- show ip route (Section 10.2.5.6)
- traceroute (Section 10.2.5.7)
- set ip route (Section 10.2.5.8)
- clear ip route (Section 10.2.5.9)
- show port mac (Section 10.2.5.10)
- show mac(Section 10.2.5.11)
- set mac (Section 10.2.5.12)
- clear mac (Section 10.2.5.13)
- show newaddrtrap (Section 10.2.5.14)
- set newaddrtrap (Section 10.2.5.15)
- show movedaddrtrap (Section 10.2.5.16)
- set movedaddrtrap (Section 10.2.5.17)

10.2.5.1 show arp

Use this command to display the switch's ARP table.

show arp

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the ARP table:

```
Matrix(rw)->show arp

LINK LEVEL ARP TABLE
IP Address       Phys Address       Flags   Interface
-------------------------------------------------------
10.20.1.1        00-00-5e-00-01-1   S       host0
134.142.21.194   00-00-5e-00-01-1   S       host0
134.142.191.192  00-00-5e-00-01-1   S       host0
134.142.192.18   00-00-5e-00-01-1   S       host0
134.142.192.119  00-00-5e-00-01-1   S       host0
-------------------------------------------------------
```

Table 10-11 provides an explanation of the command output.

Table 10-11 show arp Output Details

Output	What It Displays...
IP Address	IP address mapped to MAC address.
Phys Address	MAC address mapped to IP address.
Flags	Route status. Possible values and their definitions include: **S** - manually configured entry (static) **P** - respond to ARP requests for this entry

10.2.5.2 set arp

Use this command to add mapping entries to the switch's ARP table.

set arp *ip-address mac-address* [{**temp** | **pub** | **trail**}]

Syntax Description

ip-address	Specifies the IP address to map to the MAC address and add to the ARP table.
mac-address	Specifies the MAC address to map to the IP address and add to the ARP table.
temp	(Optional) Sets the ARP entry as not permanent. This allows the entry to time out.
pub	(Optional) Publishes the specified ARP entry. This causes the system to respond to ARP requests for this entry, even though it is not the host.
trail	(Optional) Specifies that trailer encapsulations can be sent to this host.

Command Defaults

- If **temp** is not specified, the ARP entry will be added as a permanent entry.
- If **pub** is not specified, then the ARP entry will not be published.
- If **trail** is not specified, then trailer encapsulations will not be sent to the host.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to map IP address 198.133.219.232 to MAC address 00-00-0c-40-0f-bc:

```
Matrix(rw)->set arp 198.133.219.232 00-00-0c-40-0f-bc
```

10.2.5.3 clear arp

Use this command to delete a specific entry or all entries from the switch's ARP table.

clear arp {*ip* | **all**}

Syntax Description

ip | **all**	Specifies the IP address in the ARP table to be cleared, or clears all ARP entries.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete entry 10.1.10.10 from the ARP table:

```
Matrix(rw)->clear arp 10.1.10.10
```

10.2.5.4 show rad

Use this command to display the status of the RAD (Runtime Address Discovery) protocol on the switch.

show rad

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RAD status:

```
Matrix(rw)->show rad
 RAD is currently enabled.
```

10.2.5.5 set rad

Use this command to enable or disable RAD (Runtime Address Discovery) protocol. The Matrix Series device uses BOOTP/DHCP to obtain an IP address if one hasn't been configured. RAD can also be used to retrieve a text configuration file from the network.

NOTES: In order for RAD to retrieve a text configuration file, the file must be specified in the BootP tab.

RAD on DFE devices will only accept an address from a DHCP or BootP server if the lease time for the address is set to infinity (unlimited). This will prevent the DFE from switching addresses when a lease time expires.

set rad {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables RAD.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable RAD:

```
Matrix(rw)->set rad disable
```

10.2.5.6 show ip route

Use this command to display the switch's IP routing table entries.

show ip route

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the IP routing table:

```
Matrix(rw)->show ip route

ROUTE TABLE
Destination      Gateway         Mask      TOS  Flags Refcnt Use      Interface
-------------------------------------------------------------------------------
default          12.22.73.13      00000000  0    UC    0      0        host0
10.0.0.0         12.22.73.13      ff000000  0    UC           0        host0
127.0.0.1        127.0.0.1        00000000  0     UH    0      104      lo0
```

Table 10-12 provides an explanation of the command output.

Table 10-12 show ip route Output Details

Output	What It Displays...
Destination	IP address of the host entry.
Gateway	MAC address of the destination.
Mask	IP mask of the destination.
TOS	Type of Service setting.

Table 10-12 show ip route Output Details (Continued)

Output	What It Displays...
Flags	Route status. Possible values and their definitions include: **U** - route is usable (that is, "up") **G** - destination is a gateway **H** - host specific routing entry **R** - host or net unreachable D - created dynamically (by redirect) **M** - modified dynamically (by redirect) **d** - message confirmed **C** - generate new routes on use **X** - external daemon resolves name **L** - generated by ARP **S** - manually added (static) **1** - protocol specific routing flag **2** - protocol specific routing flag
Refcnt	Number of hosts referencing this address.
Use	Number of packets forwarded via this route.
Interface	Interface type.

10.2.5.7 traceroute

Use this command to display a hop-by-hop path through an IP network from the device to a specific destination host. Three UDP or ICMP probes will be transmitted for each hop between the source and the traceroute destination.

traceroute [**-w** *waittime*] [**-f** *first-ttl*] [**-m** *max-ttl*] [**-p** *port*] [**-q** *nqueries*] [**-s** *src-addr*] [**-r**] [**-d**] [**-t** *tos*] [**-F**] [**-g** *gateway*] [**-I**] [**-n**] [**-v**] [**-x**] *host* [*packetlen*]

Syntax Description

-w *waittime*	(Optional) Specifies time in seconds to wait for a response to a probe.
-f *first-ttl*]	(Optional) Specifies the time to live (TTL) of the first outgoing probe packet.
-m *max-ttl*	(Optional) Specifies the maximum time to live (TTL) used in outgoing probe packets.
-p *port*	(Optional) Specifies the base UDP port number used in probes.
-q *nqueries*	(Optional) Specifies the number of probe inquiries.
-s *src-addr*	(Optional?) Specifies the source IP address to use in outgoing probe packets.
-r	(Optional) Bypasses the normal host routing tables.
-d	(Optional) Sets the debug socket option.
-t *tos*	(Optional) Sets the type of service (TOS) to be used in probe packets.
-F	(Optional) Sets the ‘don’t fragment’ bit.
-g *gateway*	(Optional) Specifies a loose source gateway (up to 8 can be specified), or specifies a specific gateway, such as **gw1**.
-I	(Optional) Specifies the use of ICMP echo requests rather than UDP datagrams.
-n	(Optional) Displays hop addresses numerically. (Supported in a future release.)
-v	(Optional) Displays verbose output, including the size and destination of each response.

-x	(Optional) Prevents traceroute from calculating checksums.
host	Specifies the host to which the route of an IP packet will be traced.
packetlen	(Optional) Specifies the length of the probe packet.

Command Defaults

- If not specified, *waittime* will be set to **5** seconds.
- If not specified, *first-ttl* will be set to **1** second.
- If not specified, *max-ttl* will be set to **30** seconds.
- If not specified, *port* will be set to **33434**.
- If not specified, *nqueries* will be set to **3**.
- If **-r** is not specified, normal host routing tables will be used.
- If **-d** is not specified, the debug socket option will not be used.
- If not specified, *tos* will be set to **0**.
- If **-F** is not specified, the 'don't fragment' bit will not be applied.
- If *gateway* is not specified, none will be applied.
- If **-I** is not specified, UDP datagrams will be used.
- If **-v** is not specified, summary output will be displayed.
- If **-x** is not specified, checksums will be calculated.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to use traceroute to display a round trip path to host 192.167.252.17. In this case, hop 1 is the Matrix Series switch, hop 2 is 14.1.0.45, and hop 3 is back to the host IP address. Round trip times for each of the three UDP probes are displayed next to each hop:

```
Matrix(rw)->traceroute 192.167.252.17
traceroute to 192.167.252.17 (192.167.252.17), 30 hops max, 40 byte packets
  1  matrix.enterasys.com (192.167.201.40)  20.000 ms  20.000 ms  20.000 ms
  2  14.1.0.45 (14.1.0.45)  40.000 ms  10.000 ms  20.000 ms
  3  192.167.252.17 (192.167.252.17)  50.000 ms  0.000 ms  20.000 ms
```

10.2.5.8 set ip route

Use this command to add a route to the switch's IP routing table.

set ip route {*destination* | **default**} *gateway*

Syntax Description

destination	Specifies the IP address of the network or host to be added.
default	Sets the default gateway.
gateway	Specifies the IP address of the next-hop device.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to add an IP route from 192.122.173.42 to 192.122.168.38 to the routing table:

```
Matrix(rw)->set ip route 192.122.173.42 192.122.168.38
```

10.2.5.9 clear ip route

Use this command to delete switch IP routing table entries.

clear ip route *destination* | **default**

Syntax Description

destination	Specifies the IP address of the network or host to be cleared.
default	Clears the default gateway.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the default gateway:

```
Matrix(rw)->clear ip route default
```

10.2.5.10 show port mac

Use this command to display the MAC address(es) for one or more ports. These are port MAC addresses programmed into the device during manufacturing. To show the MAC addresses learned on a port through the switching process, use the **show mac** command as described in Section 10.2.5.11.

show port mac [*port-string*]

Syntax Description

port-string	(Optional) Displays MAC addresses for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, MAC addresses for all ports will be displayed.

Command Mode

Read-Only.

Example

This example shows how to display the MAC address for 1-Gigabit Ethernet port 4 in module 2:

```
Matrix(rw)->show port mac fe.2.4

Port             MAC Address
------------  ----------------------
fe.2.4        00-01-F4-DA-32-FE
```

10.2.5.11 show mac

Use this command to display the timeout period for aging learned MAC addresses, and to show MAC addresses in the switch's filtering database. These are addresses learned on a port through the switching process or statically entered. To show port MAC addresses programmed into the device during manufacturing, use the **show port mac** command as described in Section 10.2.5.10.

show mac [**agetime**] [**address** *mac-address*] [**fid** *fid*] [**vlan-id** *vlan-id*] [**port-string** *port-string*] [**type** {**other** | **invalid** | **learned** | **self** | **mgmt**}] [**field-decode**] [**-verbose**]

Syntax Description

agetime	(Optional) Display the time in seconds that a learned MAC address will stay in the filtering database.
address *mac-address*	(Optional) Displays a specific MAC address (if it is known by the device).
fid *fid*	(Optional) Displays MAC addresses for a specific filter database identifier.
vlan-id *vlan-id*	(Optional) Displays MAC addresses for a specific VLAN based on the VLAN ID, for static multicast entries only.
port-string *port-string*	(Optional) Displays MAC addresses for a specific port or range of ports. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
type other | **invalid** | **learned** | **self** | **mgmt**	(Optional) Display MAC addresses defined as **other**, **invalid**, **learned**, **self** or **mgmt** (management).
field-decode	(Optional) Display the meanings of the fields in the **show mac** command.
-verbose	(Optional) Displays all MAC address information in detail.

Command Defaults

If no parameters are specified, all MAC addresses for the device will be displayed.

Command Mode

Read-Only.

Examples

This example shows how to display the MAC address timeout period:

```
Matrix(rw)->show mac agetime
Aging time: 300 seconds
```

This example shows how to display MAC address information for Fast Ethernet port 3 in module 1:

```
Matrix(rw)->show mac port-string fe.1.3

MAC Address       FID  Port          Type    Status
----------------- ---- ------------- ------- -------
00-01-F4-32-88-C5 0    fe.1.3        self
00-00-1D-12-11-88 3    fe.1.3        mgmt    perm
```

Table 10-13 provides an explanation of the command output.

Table 10-13 show mac Output Details

Output	What It Displays...
MAC Address	MAC addresses mapped to the port(s) shown.
FID	Filter database identifier.
Port	Port designation.
Type	Address type. Valid types are: • other - entry is other than below • invalid - entry is no longer valid, but has not been yet flushed-out • learned - entry has been learned and is currently used • self - entry represents one of the device's address • mgmt - entry represents a dot1qStaticUnicastAddress (manually entered MAC address) • mcast - entry represents a dot1qStaticMulticastAddress
Status	Address status. Valid types are: • other - entry is other than below • invalid - entry shall be removed • perm - entry is currently in use and shall remain so AFTER the next reset (permanent)

10.2.5.12 set mac

Use this command to set the timeout period for aging learned MAC entries, to define what ports a multicast address can be dynamically learned on or flooded to, and to make a static entry into the filtering database(s).

set mac [**agetime** *time*] | [**multicast** *mac-address vlan-id* [*port-string*] {**append** | **clear**}] | [**unicast** *mac-address fid receive-port* [**ageable**]]

Syntax Description

agetime *time*	Specifies the timeout period in seconds for aging learned MAC addresses. Valid values are **10** to **65535**.
multicast *mac-address vlan-id* [*port-string*] {**append** | **clear**}]	This command allows you to limit specific layer two multicast addresses (*mac-address*) to specific ports (*port-string*) within a VLAN (*vlan-id*). You can later come back and **append** or **clear** ports from the list of ports the multicast MAC address is allowed to be dynamically learned on or flooded to.
unicast *mac-address fid receive-port* [**ageable**]	This command allows you to statically enter a unicast MAC address (*mac-address*) into a filtering database (*fid*) for a single port (*receive-port*). This entry will be either permanent or **ageable** where it will age out same as a dynamically learned MAC address.

Command Defaults

If port-string is not defined with the **set mac multicast** command then it will apply to all ports.

If the **set mac unicast** command is used without the **ageable** parameter the entry will be permanent.

Command Mode

Read-Write.

Example

This example shows how to set the MAC timeout period to 600 seconds:

```
Matrix(rw)->set mac agetime 600
```

10.2.5.13 clear mac

Use this command to reset the timeout period for aging learned MAC entries to the default value of 300 seconds, or to clear MAC addresses out of the filtering database(s).

clear mac {[**all**] | [**address** *address*] [**fid** *fid*] | [**vlan-id** *vlan-id*] | [**port-string** *port-string*] [**type** {learned | mgmt}]} | [**agetime**]

Syntax Description

all	Clear all MAC address entries. This will even clear permanent entries.
address *address*	MAC address to clear (ex. 00-01-F4-56-78-90); if not specified, clear command shall be scoped to all MAC address.
fid *fid*	Filtering database id to clear; if not specified, clear command shall be scoped to all filtering database ids.
vlan-id *vlan-id*	Specify a VLAN ID from which to clear the MAC address for static multicast entries only.
port-string *port-string*	Single port to clear (ex. fe.1.1); if not specified, clear command shall be scoped to all ports.
type {learned | mgmt}	Status type to clear; if not specified, clear command shall be scoped to all 'learned' and 'mgmt' entries where mgmt refers to all statically entered MAC addresses.
agetime	Clear timeout period to default value of 300 seconds.

Syntax Description

None.

Command Defaults

None, except those noted above.

Command Mode

Read-Write.

Examples

This example shows how to clear the MAC timeout period:

```
Matrix(rw)->clear mac agetime
```

This example shows how to clear all the MAC addresses associated with port fe.1.3:

```
Matrix(rw)->clear mac port-string fe.1.3
```

10.2.5.14 show newaddrtraps

Use this command to display the status of MAC address traps on one or more ports.

show newaddrtrap [*port-string*]

Syntax Description

port-string	(Optional) Displays MAC address traps for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, MAC address traps for all ports will be displayed.

Command Mode

Read-Only.

Example

This example shows how to display the status of MAC address traps on ge.1.1 through 3:

```
Matrix(rw)->show newaddrtrap
New Address Traps Globally disabled

Port        Enable State
--------- ------------
ge.1.1    disabled
ge.1.2    disabled
ge.1.3    disabled
```

10.2.5.15 set newaddrtraps

Use this command to enable or disable SNMP trap messaging, globally or on one or more ports, when new source MAC addresses are detected.

set newaddrtrap [*port-string*] {**enable** | **disable**}

Syntax Description

port-string	(Optional) Specifies the port(s) on which to enable or disable MAC address traps. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
enable | **disable**	Enables or disables SNMP trap messaging when new source MAC addresses are detected.

Command Defaults

If *port-string* is not specified, MAC address traps will be globally enabled or disabled.

Command Mode

Read-Write.

Example

This example shows how to globally enable MAC address traps:

```
Matrix(rw)->set newaddrtrap enable
```

10.2.5.16 show movedaddrtrap

Use this command to display the status of moved MAC address traps on one or more ports.

show movedaddrtrap [*port-string*]

Syntax Description

port-string	(Optional) Displays MAC address traps for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, MAC address traps for all ports will be displayed.

Command Mode

Read-Only.

Example

This example shows how to display the status of MAC address traps on ge.1.1 through 3:

```
Matrix(rw)->show movedaddrtrap ge.1.1-3
Moved Address Traps Globally enabled

Port         Enable State
---------  ------------
ge.1.1      enabled
ge.1.2      enabled
ge.1.3      enabled
```

10.2.5.17 set movedaddrtrap

Use this command to enable or disable SNMP trap messaging, globally or on one or more ports, when moved source MAC addresses are detected.

set movedaddrtrap [*port-string*] {**enable** | **disable**}

Syntax Description

port-string	(Optional) Specifies the port(s) on which to enable or disable MAC address traps. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
enable | **disable**	Enables or disables SNMP trap messaging when moved source MAC addresses are detected.

Command Defaults

If *port-string* is not specified, MAC address traps will be globally enabled or disabled.

Command Mode

Read-Write.

Example

This example shows how to globally enable MAC address traps:

```
Matrix(rw)->set movedaddrtrap enable
```

10.2.6 Configuring Simple Network Time Protocol (SNTP)

Purpose

To configure the Simple Network Time Protocol (SNTP), which synchronizes device clocks in a network.

Commands

Commands to configure SNTP are listed below and described in the associated section as shown.

- show sntp (Section 10.2.6.1)
- set sntp client (Section 10.2.6.2)
- clear sntp client (Section 10.2.6.3)
- set sntp server (Section 10.2.6.4)
- clear sntp server (Section 10.2.6.5)
- set sntp broadcastdelay (Section 10.2.6.6)
- clear sntp broadcastdelay (Section 10.2.6.7)
- set sntp poll-interval (Section 10.2.6.8)
- clear sntp poll-interval (Section 10.2.6.9)
- set sntp poll-retry (Section 10.2.6.10)
- clear sntp poll-retry (Section 10.2.6.11)
- set sntp poll-timeout (Section 10.2.6.12)
- clear sntp poll-timeout (Section 10.2.6.13)
- show timezone (Section 10.2.6.14)
- set timezone (Section 10.2.6.15)
- clear timezone (Section 10.2.6.16)

10.2.6.1 show sntp

Use this command to display SNTP client settings.

show sntp

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNTP client settings:

```
Matrix(rw)->show sntp
SNTP Version: 3
Current Time: TUE SEP 09 16:13:33 2003
Timezone: 'EST', offset from UTC is -4 hours and 0 minutes
Client Mode: unicast
Broadcast Delay: 3000 microseconds
Broadcast Count: 0
Poll Interval: 512 seconds
Poll Retry: 1
Poll Timeout: 5 seconds
SNTP Poll Requests: 1175
Last SNTP Update: TUE SEP 09 16:05:24 2003
Last SNTP Request: TUE SEP 09 16:05:24 2003
Last SNTP Status: Success

SNTP-Server       Precedence       Status
-----------------------------------------
10.2.8.6              2            Active
144.111.29.19         1            Active
```

Table 10-14 provides an explanation of the command output.

Table 10-14 show sntp Output Details

Output	What It Displays...
SNTP Version	SNTP version number.
Current Time	Current time on the system clock.
Timezone	Time zone name and amount it is offset from UTC (Universal Time). Set using **set timezone** command (Section 10.2.6.15).
Client Mode	Whether SNTP client is operating in unicast or broadcast mode. Set using **set sntp client** command (Section 10.2.6.2).
Broadcast Delay	Round trip delay for SNTP broadcast frames. Default of 3000 microseconds can be reset using the **set sntp broadcastdelay** command (Section 10.2.6.6).
Broadcast Count	Number of SNTP broadcast frames received.
Poll Interval	Interval between SNTP unicast requests. Default of 512 seconds can be reset using the **set sntp poll-interval** command (Section 10.2.6.8).
Poll Retry	Number of poll retries to a unicast SNTP server. Default of 1 can be reset using the **set sntp poll-retry** command (Section 10.2.6.10).
Poll Timeout	Timeout for a response to a unicast SNTP request. Default of 5 seconds can be reset using **set sntp poll-timeout** command (Section 10.2.6.13).
SNTP Poll Requests	Total number of SNTP poll requests.
Last SNTP Update	Date and time of most recent SNTP update.
Last SNTP Request	Date and time of most recent SNTP update.
Last SNTP Status	Whether or not broadcast reception or unicast transmission and reception was successful.
SNTP-Server	IP address(es) of SNTP server(s).
Precedence	Precedence level of SNTP server in relation to its peers. Highest precedence is 1 and lowest is 10. Default of 1 can be reset using the **set sntp server** command (Section 10.2.6.4).
Status	Whether or not the SNTP server is active.

10.2.6.2 set sntp client

Use this command to set the SNTP operation mode.

set sntp client {**broadcast** | **unicast** | **disable**}

Syntax Description

broadcast	Enables SNTP in broadcast client mode.
unicast	Enables SNTP in unicast (point-to-point) client mode. In this mode, the client must supply the IP address from which to retrieve the current time.
disable	Disables SNTP.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable SNTP in broadcast mode:

```
Matrix(rw)->set sntp client broadcast
```

10.2.6.3 clear sntp client

Use this command to clear the SNTP client's operational mode.

clear sntp client

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the SNTP client's operational mode:

```
Matrix(rw)->clear sntp client
```

10.2.6.4 set sntp server

Use this command to add a server from which the SNTP client will retrieve the current time when operating in unicast mode. Up to 10 servers can be set as SNTP servers.

set sntp server *ip-address* [*precedence*]

Syntax Description

ip-address	Specifies the SNTP server's IP address.
precedence	(Optional) Specifies this SNTP server's precedence in relation to its peers. Valid values are **1** (highest) to **10** (lowest).

Command Defaults

If *precedence* is not specified, 1 will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the server at IP address 10.21.1.100 as an SNTP server:

```
Matrix(rw)->set sntp server 10.21.1.100
```

10.2.6.5 clear sntp server

Use this command to remove one or all servers from the SNTP server list.

clear sntp server {*ip-address* | **all**}

Syntax Description

ip-address	Specifies the IP address of a server to remove from the SNTP server list.
all	Removes all servers from the SNTP server list.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove the server at IP address 10.21.1.100 from the SNTP server list:

```
Matrix(rw)->clear sntp server 10.21.1.100
```

10.2.6.6 set sntp broadcastdelay

Use this command to set the round trip delay, in microseconds, for SNTP broadcast frames.

set sntp broadcastdelay *time*

Syntax Description

time	Specifies broadcast delay time in microseconds. Valid values are **1** to **999999**. Default value is **3000**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the SNTP broadcast delay to 12000 microseconds:

```
Matrix(rw)->set sntp broadcastdelay 12000
```

10.2.6.7 clear sntp broadcast delay

Use this command to clear the round trip delay time for SNTP broadcast frames.

clear sntp broadcastdelay

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the SNTP broadcast delay time:

```
Matrix(rw)->clear sntp broadcastdelay
```

10.2.6.8 set sntp poll-interval

Use this command to set the poll interval between SNTP unicast requests.

set sntp poll-interval *interval*

Syntax Description

interval	Specifies the poll interval in seconds. Valid values are **16** to **16284**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the SNTP poll interval to 30 seconds:

```
Matrix(rw)->set sntp poll-interval 30
```

10.2.6.9 clear sntp poll-interval

Use this command to clear the poll interval between unicast SNTP requests.

clear sntp poll-interval

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the SNTP poll interval:

```
Matrix(rw)->clear sntp poll-interval
```

10.2.6.10 set sntp poll-retry

Use this command to set the number of poll retries to a unicast SNTP server.

set sntp poll-retry *retry*

Syntax Description

retry	Specifies the number of retries. Valid values are **0** to **10.**

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the number of SNTP poll retries to 5:

```
Matrix(rw)->set sntp poll-retry 5
```

10.2.6.11 clear sntp poll-retry

Use this command to clear the number of poll retries to a unicast SNTP server.

clear sntp poll-retry

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the number of SNTP poll retries:

```
Matrix(rw)->clear sntp poll-retry
```

10.2.6.12 set sntp poll-timeout

Use this command to set the poll timeout (in seconds) for a response to a unicast SNTP request.

set sntp poll-timeout *timeout*

Syntax Description

timeout	Specifies the poll timeout in seconds. Valid values are **1** to **30**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the SNTP poll timeout to 10 seconds:

```
Matrix(rw)->set sntp poll-timeout 10
```

10.2.6.13 clear sntp poll-timeout

Use this command to clear the SNTP poll timeout.

clear sntp poll-timeout

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the SNTP poll timeout:

```
Matrix(rw)->clear sntp poll-timeout
```

10.2.6.14 show timezone

Use this command to display SNTP time zone settings.

show timezone

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNTP time zone settings:

```
Matrix(rw)->show timezone
Admin Config timezone: '', offset from UTC is 5 hours and 0 minutes
Oper  Config timezone: '', offset from UTC is 5 hours and 0 minutes
```

10.2.6.15 set timezone

Use this command to set the SNTP time zone name and the hours and minutes it is offset from Coordinated Universal Time (UTC).

set timezone *name* [*hours*] [*minutes*]

Syntax Description

name	Specifies the time zone name.
hours	(Optional) Specifies the number of hours this timezone will be offset from UTC. Valid values are minus 12 (**-12**) to **12**.
minutes	(Optional) Specifies the number of minutes this timezone will be offset from UTC. Valid values are **0** to **59**.

Command Defaults

If offset *hours* or *minutes* are not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the time zone to EST with an offset of minus 5 hours:

```
Matrix(rw)->set timezone ETS -5 0
```

10.2.6.16 clear timezone

Use this command to remove SNTP time zone adjustment values.

clear timezone

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove SNTP time zone adjustment values:

```
Matrix(rw)->clear timezone
```

10.2.7 Configuring Node Aliases

Purpose

To review, configure, disable and re-enable node (port) alias functionality, which determines what network protocols are running on one or more ports.

Commands

Commands to configure node aliases are listed below and described in the associated section as shown.

- show nodealias (Section 10.2.7.1)
- show nodealias mac (Section 10.2.7.2)
- show nodealias protocol (Section 10.2.7.3)
- show nodealias config (Section 10.2.7.4)
- set nodealias (Section 10.2.7.5)
- set nodealias maxentries (Section 10.2.7.6)
- clear nodealias (Section 10.2.7.7)
- clear nodealias config (Section 10.2.7.8)

10.2.7.1 show nodealias

Use this command to display node alias properties for one or more ports.

show nodealias [*port-string*]

Syntax Description

port-string	(Optional) Displays node alias properties for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, node alias properties will be displayed for all ports.

Command Mode

Read-Only.

Example

This example (a portion of the command output) shows how to display node alias properties for ge.3.12:

```
Matrix(rw)->show nodealias ge.3.12

Alias ID      = 1533917044        Active      = true
Vlan ID       = 1                 MAC Address = 00-e0-63-04-7b-00
Protocol      = ip                Source IP = 63.214.44.63
```

Table 10-15 provides an explanation of the command output.

Table 10-15 show nodealias Output Details

Output	What It Displays...
Alias ID	Alias dynamically assigned to this port. **NOTE:** Node aliases are dynamically assigned upon packet reception to ports enabled with an alias agent, which is the default setting on Matrix Series devices. Node aliases cannot be statically created, but can be deleted using the **clear node alias** command (Section 10.2.7.7).
Active	Whether or not this node alias entry is active.

Table 10-15 show nodealias Output Details (Continued)

Output	What It Displays...
Vlan ID	VLAN ID associated with this alias.
MAC Address	MAC address associated with this alias.
Protocol	Networking protocol running on this port.
Address / Source IP	When applicable, a protocol-specific address associated with this alias.

10.2.7.2 show nodealias mac

Use this command to display node alias entries based on MAC address and protocol.

show nodealias mac *mac_address* [**ip** | **apl** | **mac** | **hsrp** | **dhcps** | **dhcpc** | **bootps** | **bootpc** | **ospf** | **vrrp** | **ipx** | **xrip** | **xsap** | **ipx20** | **rtmp** | **netBios** | **nbt** | **bgp** | **rip** | **igrp** | **dec** | **bpdu** | **udp**] [*port-string*]

Syntax Description

mac_address	Specifies a MAC address for which to display node alias entries. This can be a full or partial address.
ip | **apl** | **mac** | **hsrp** | **dhcps** | **dhcpc** | **bootps** | **bootpc** | **ospf** | **vrrp** | **ipx** | **xrip** | **xsap** | **ipx20** | **rtmp** | **netBios** | **nbt** | **bgp** | **rip** | **igrp** | **dec** | **bpdu** | **udp**	(Optional) Displays node alias entries for one of the following protocols: • Internet Protocol • Appletalk • Media Access Control • Hot Standby Routing Protocol • Dynamic Host Control Protocol Server • Dynamic Host Control Protocol Client • Boot Protocol Server • Boot Protocol Client • Open Shortest Path First • Virtual Router Redundancy Protocol • Internet Packet Exchange • IPX Routing Information Protocol • IPX Service Access Point • PX Protocol 20 packet • Routing Table Maintenance Protocol • NetBIOS (raw) • NetBIOS (over TCP/IP) • Border Gateway Protocol • Routing Information Protocol • Interior Gateway Routing Protocol • Digital Equipment Corporation • Bridge Protocol Data Unit • User Datagram Protocol
port-string	(Optional) Displays node alias properties for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

- If protocol is not specified, node alias entries for all protocols will be displayed.
- If *port-string* is not specified, node alias entries will be displayed for all ports.

Command Mode

Read-Only.

Example

This example shows how to display node alias entries for BPDU traffic on MAC addresses beginning with 00-e0. Refer back to Table 10-15 for a description of the command output.

```
Matrix(rw)->show nodealias mac 00-e0 bpdu
Port: lag.0.1   Time: 0 days 01 hrs 34 mins 53 secs
-------------------------------------------------------
Alias ID         = 306783575       Active           = true
Vlan ID          = 1               MAC Address      = 00-e0-63-59-f4-3d
Protocol         = bpdu

Port: lag.0.1   Time: 0 days 01 hrs 34 mins 54 secs
-------------------------------------------------------
Alias ID         = 306783579       Active           = true
Vlan ID          = 1               MAC Address      = 00-e0-63-59-f4-55
Protocol         = bpdu

Port: ge.3.14   Time: 0 days 00 hrs 00 mins 46 secs
-------------------------------------------------------
Alias ID         = 613566759       Active           = true
Vlan ID          = 1               MAC Address      = 00-e0-63-97-4b-69
Protocol         = bpdu

Port: ge.3.17   Time: 0 days 03 hrs 03 mins 52 secs
-------------------------------------------------------
Alias ID         = 613566837       Active           = true
Vlan ID          = 1               MAC Address      = 00-e0-63-97-d0-a0
Protocol         = bpdu
```

10.2.7.3 show nodealias protocol

Use this command to display node alias entries based on protocol and protocol address.

show nodealias protocol {**ip** | **apl** | **mac** | **hsrp** | **dhcps** | **dhcpc** | **bootps** | **bootpc** | **ospf** | **vrrp** | **ipx** | **xrip** | **xsap** | **ipx20** | **rtmp** | **netBios** | **nbt** | **bgp** | **rip** | **igrp** | **dec** | **bpdu** | **udp**} [**ip-address** *ip-address*] [*port-string*]

Syntax Description

ip | **apl** | **mac** | **hsrp** | **dhcps** | **dhcpc** | **bootps** | **bootpc** | **ospf** | **vrrp** | **ipx** | **xrip** | **xsap** | **ipx20** | **rtmp** | **netBios** | **nbt** | **bgp** | **rip** | **igrp** | **dec** | **bpdu** | **udp**	Specifies the protocol for which to display node alias entries. Refer back **show nodealias mac** (Section 10.2.7.2) for a detailed description of these parameters.
ip-address *ip-address*	(Optional) Used for IP protocol only, displays node alias entries for a specific source address.
port-string	(Optional) Displays node alias entries for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

- If *ip-address* is not specified for the IP protocol, IP-related entries will be displayed from all source addresses.
- If *port-string* is not specified, node alias entries will be displayed for all ports.

Command Mode

Read-Only.

Example

This example shows how to display node alias entries for IP traffic on ge.3.16. Refer back to Table 10-15 for a description of the command output.

```
Matrix(rw)->show nodealias protocol ip ge.3.16
Port: ge.3.16 Time: 1 days 03 hrs 33 mins 47 secs
-------------------------------------------------------
Alias ID          = 1533917141      Active           = true
Vlan ID           = 1               MAC Address      = 00-e0-63-04-7b-00
Protocol          = ip              Source IP        = 199.45.62.25
```

10.2.7.4 show nodealias config

Use this command to display node alias configuration settings on one or more ports.

show nodealias config [*port-string*]

Syntax Description

port-string	(Optional) Displays node alias configuration settings for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, node alias configurations will be displayed for all ports.

Command Mode

Read-Only.

Example

This example shows how to display node alias configuration settings for ports fe.2.1 through 9:

```
Matrix(rw)->show nodealias config fe.2.1-9
Port Number          Max Entries          Used Entries          Status
-----------          -----------          ------------          ------
fe.2.1               16                   0                     Enabled
fe.2.2               47                   0                     Enabled
fe.2.3               47                   2                     Enabled
fe.2.4               47                   0                     Enabled
fe.2.5               47                   0                     Enabled
fe.2.6               47                   2                     Enabled
fe.2.7               47                   0                     Enabled
fe.2.8               47                   0                     Enabled
fe.2.9               4000                 1                     Enabled
```

Table 10-16 provides an explanation of the command output.

Table 10-16 show nodealias config Output Details

Output	What It Displays...
Port Number	Port designation.
Max Entries	Maximum number of alias entries configured for this port. Set using the **set nodealias maxentries** command (Section 10.2.7.6).
Used Entries	Number of alias entries (out of the maximum amount configured) already used by this port.
Status	Whether or not a node alias agent is enabled (default) or disabled on this port.

10.2.7.5 set nodealias

Use this command to enable or disable a node alias agent on one or more ports. Upon packet reception, node aliases are dynamically assigned to ports enabled with an alias agent, which is the default setting on Matrix Series devices. Node aliases cannot be statically created, but can be deleted using the clear node alias command as described in Section 10.2.7.7.

set nodealias {**enable** | **disable**} *port-string*

Syntax Description

enable | **disable**	Enables or disables a node alias agent.
port-string	Specifies the port(s) on which to enable or disable a node alias agent. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable the node alias agent on fe.1.3:

```
Matrix(rw)->set nodealias disable fe.1.3
```

10.2.7.6 set nodealias maxentries

Use this command to set the maximum number of node alias entries allowed for one or more ports.

set nodealias maxentries *val port-string*

Syntax Description

val	Specifies the maximum number of alias entries.
port-string	Specifies the port(s) on which to set the maximum entry value. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the maximum node alias entries to 1000 on fe.1.3:

```
Matrix(rw)->set nodealias maxentries 1000 fe.1.3
```

10.2.7.7 clear nodealias

Use this command to remove one or more node alias entries.

clear nodealias {**port-string** *port-string* | **alias-id** *alias-id*}

Syntax Description

port-string *port-string*	Specifies the port(s) on which to remove all node alias entries. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
alias-id *alias-id*	Specifies the ID of the node alias to remove. This value can be viewed using the **show nodealias** command as described in Section 10.2.7.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all node alias entries on fe.1.3:

```
Matrix(rw)->clear nodealias port-string fe.1.3
```

10.2.7.8 clear nodealias config

Use this command to reset node alias state to enabled and clear the maximum entries value.

clear nodealias config *port-string*

Syntax Description

port-string	Specifies the port(s) on which to reset the node alias configuration. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the node alias configuration on fe.1.3:

```
Matrix(rw)->clear nodealias config fe.1.3
```

10.2.8 Configuring NetFlow

Purpose

Netflow is a software feature and also the name of an open (but proprietary) Cisco protocol for collecting IP traffic information. Devices with NetFlow enabled generate netflow records, which are exported from the device in UDP packets and collected using a NetFlow collector.

Commands

Commands to configure NetFlow are listed below and described in the associated section as shown.

- show netflow (Section 10.2.8.1)
- set netflow(Section 10.2.8.2)
- clear netflow(Section 10.2.8.3)

10.2.8.1 show netflow

Use this command to display NetFlow configuration and statistics.

show netflow [**config**] [**statistics** {**export**}]

Syntax Description

config	(Optional) Show the NetFlow configuration.
statistics	(Optional) Show the NetFlow statistics.
export	**export** - Show the Netflow export statistics.

Command Defaults

If no parameters are entered, both NetFlow configuration and statistics are displayed.

Command Type

Switch command.

Command Mode

Read Only.

Example

This example shows how to display both Netflow configuration and statistics:

```
Matrix(rw)->show netflow
Matrix N-SA Platinum(su)->show netflow

Cache Status:          enabled
Destination IP:        10.10.1.1
Destination UDP Port: 2055
Export Version:        5
Export Interval:       30 (min)
Number of Entries:     196607
Inactive Timer:        40 (sec)

Enabled Ports:
-----------------
ge.1.11,23

Disabled Ports:
-----------------
lag.0.1-48
ge.1.1-10,12-22,24-52


Export Statistics:
------------------------------------
Network Packets Sampled:           232
Exported Packets:                  43
Exported Records:                  36
Export Packets Failed:             0
Export Records Dropped:            0
```

10.2.8.2 set netflow

Use this command to configure NetFlow.

set netflow [**cache** {**enable** | **disable**}] [**export-destination** *ip-address* [*udp-port*]] [**export-interval** *interval*] [**port** *port-string* {**enable** | **disable**}]

Syntax Description

cache enable | **disable**	Enable or disable the collection for a NetFlow cache
export-destination *ip-address udp-port*	Sets the destination IP address of NetFlow collector. *ip-address* specifies the IP address of the NetFlow collect. (Optional) *udp-port* specifies the UDP port number used by the NetFlow collector (default is 2055).
export-interval *interval*	Set the active flow timer value, between 1 to 60 minutes. The default value is 30 minutes.
port *port-string* **enable** | **disable**	Enable or disable NetFlow collection on a port(s)

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write

Examples

This example shows how to enable Netflow cache:

```
Matrix(rw)->set netflow cache enable
```

This example shows how to set the IP address of the Netflow collector:

```
Matrix(rw)->set netflow export-destination 10.10.1.1
```

This example shows how to enable Netflow collector on port ge.1.11:

```
Matrix(rw)->set netflow port ge.1.11 enable
```

10.2.8.3 clear netflow

Use this command to clear NetFlow parameters to factory defaults.

clear netflow [**cache**] [**all**] [**export-destination** *ip-address* [*udp-port*]] [**export-interval**] [**port** *port-string*]

Syntax Description

cache	Clears the collection status for a NetFlow cache.
all	Clears all NetFlow configuration back to factory defaults.
export-destination *ip-address udp-port*	Clears the collector with specified address. *ip-address* specifies the IP address of the NetFlow collector. (Optional) *udp-port* specifies the UDP port number used by NetFlow collector (default is 2055).
export-interval	Clears the active flow timer value back to the default value of 30 minutes.
port *<port-string>*	Clears the collection status on a port(s).

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write

Example

This example shows how to clear the Netflow cache:

```
Matrix(rw)->clear netflow cache
```

This example shows how to clear the Netflow collection on port ge.1.11:

```
Matrix(rw)->clear netflow port ge.1.11
```

11

IP Configuration

This chapter describes the Internet Protocol (IP) configuration set of commands and how to use them.

ROUTER: Unless otherwise noted, the commands covered in this chapter can be executed only when the device is in router mode. For details on how to enable router configuration modes, refer to Section 2.3.3.

11.1 PROCESS OVERVIEW: INTERNET PROTOCOL (IP) CONFIGURATION

Use the following steps as a guide to configuring IP on the device:

1. Configuring routing interface settings (Section 11.2.1)
2. Managing router configuration files (Section 11.2.2)
3. Performing a basic router configuration (Section 11.2.3)
4. Reviewing and configuring the ARP table (Section 11.2.4)
5. Reviewing and configuring broadcast settings (Section 11.2.5)
6. Reviewing IP traffic and configuring routes (Section 11.2.6)
7. Configuring PIM (Section 11.2.7)
8. Configuring Load Sharing Network Address Translation (LSNAT) (Section 11.2.8)
9. Configuring Dynamic Host Configuration Protocol (DHCP) (Section 11.2.9)

11.2 IP CONFIGURATION COMMAND SET

11.2.1 Configuring Routing Interface Settings

About Loopback vs. VLAN Interfaces

Loopback interfaces are different from VLAN routing interfaces because they allow you to disconnect the operation of routing protocols from network hardware operation, improving the reliability of IP connections. A loopback interface is always reachable. The IP address assigned to the loopback interface is used as the router ID, which helps when running protocols like OSPF, because OSPF can be running even when the outbound interface is down. IP packets routed to the loopback interface are rerouted back to the router or access server and processed locally.

Routing interface configuration commands in this guide will configure either a VLAN or loopback interface, depending on your choice of parameters, as shown in Table 11-1.

Table 11-1 VLAN and Loopback Interface Configuration Modes

For Routing Interface Type...	Enter (in Global Configuration Mode)...	Resulting Prompt...
VLAN	**vlan** *vlan-id*	**Matrix>Router1 (config-if(Vlan 1))#**
Loopback	**loopback** *loopback-id*	**Matrix>Router1 (config-if (Lpbk 1))#**
Local (software loopback)	**lo** *local-id*	**Matrix>Router1 (config-if (Lo 1))#**

For details on how to enable all router CLI configuration modes, refer back to Table 2-14.

For details on configuring routing protocols, refer to Chapter 12.

NOTE: The command prompts used in examples throughout this guide show a system where module (or standalone device) 1 and VLAN 1 have been configured for routing. The prompt changes depending on your current configuration mode, the specific module, and the interface types and numbers configured for routing on your system.

Purpose

To enable routing interface configuration mode on the device, to create VLAN or loopback routing interfaces, to review the usability status of interfaces configured for IP, to set IP addresses for interfaces, and to enable interfaces for IP routing at device startup.

Commands

The commands used to review and configure interface settings are listed below and described in the associated section as shown:

- show interface (Section 11.2.1.1)
- interface (Section 11.2.1.2)
- ip ecm-forwarding-algorithm (Section 11.2.1.3)
- show ip interface (Section 11.2.1.4)
- ip address (Section 11.2.1.5)
- no shutdown (Section 11.2.1.6)

11.2.1.1 show interface

Use this command to display information about one or more interfaces (VLANs or loopbacks) configured on the router.

show interface [**vlan** *vlan-id* | **loopback** *loopback-id* | **lo** *local-id*]

Syntax Description

vlan *vlan-id* | **loopback** *loopback-id* | **lo** *local-id*	(Optional) Displays interface information for a specific VLAN, loopback, or local interface. This interface must be configured for IP routing as described in Section 2.3.1.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If interface type is not specified, information for all routing interfaces will be displayed.

Example

This example shows how to display information for all interfaces configured on the router. In this case, one loopback interface has been configured for routing. For a detailed description of this output, refer to Table 11-2:

```
Matrix>Router1#show interface
Vlan 1 is Administratively DOWN
 Vlan 1 is Operationally DOWN
 Mac Address is: 0001.f4da.2cba
 The name of this device is Vlan 1
 The MTU is 1500 bytes
 The bandwidth is 10000 Mb/s
 Encapsulation ARPA, Loopback not set
 ARP type: ARPA, ARP Timeout: 14400 seconds

lo is Administratively UP
 lo is Operationally UP
 Internet Address is 127.0.0.1, Subnet Mask is 255.255.255.0
 The name of this device is lo
 The MTU is 1500 bytes
 The bandwidth is 10000 Mb/s
```

11.2.1.2 interface

Use this command to configure interfaces for IP routing. This command enables interface configuration mode from global configuration mode, and, if the interface has not previously been created, this command creates a new routing interface. For details on configuration modes supported by the Matrix Series device and their uses, refer to Table 2-14 in Section 2.3.3.

interface {vlan *vlan-id* | **loopback** *loopback-id*}

NOTES: VLANs must be created from the switch CLI before they can be configured for IP routing. For details on creating VLANs and configuring them for IP, refer to Section 2.3.2.

Each VLAN or loopback interface must be configured for routing separately using the **interface** command. To end configuration on one interface before configuring another, type **exit** at the command prompt. Enabling interface configuration mode is required for completing interface-specific configuration tasks. For an example of how these commands are used, refer to Figure 2-8 in Section 2.3.1.

Each Matrix Series routing module or standalone device can support up to 96 routing interfaces. Each interface can be configured for the RIP and/or OSPF routing protocols.

Syntax Description

vlan *vlan-id* | **loopback** *loopback-id*	Specifies the number of the VLAN or loopback interface to be configured for routing. This interface must be configured for IP routing as described in Section 2.3.1.

Command Type

Router command.

Command Mode

Global configuration mode: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to enter configuration mode for VLAN 1:

```
Matrix>Router1#configure terminal
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#
```

11.2.1.3 ip ecm-forwarding-algorithm

Use this command to enable ECM (Equal Cost Multipath) for forwarding IP packets on routing interfaces.

ip ecm-forwarding-algorithm [**hash-thold** | **round-robin**]

Syntax Description

hash-thold | **round-robin**	(Optional) Sets the ECM forwarding algorithm as hash threshold or round-robin.

Command Syntax of the "no" Form

The "no" form of this command disables ECM mode.

no ip ecm-forwarding-algorithm

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

If algorithm is not specified, hash threshold will be set.

Example

This example shows how to enable ECM mode:

```
Matrix>Router1(config)#ip ecm-forwarding-algorithm
```

11.2.1.4 show ip interface

Use this command to display information, including administrative status, IP address, MTU (Maximum Transmission Unit) size and bandwidth, and ACL configurations, for interfaces configured for IP.

show ip interface [**vlan** *vlan-id* | **loopback** *loopback-id* | **lo** *loopback-id*]

Syntax Description

vlan *vlan-id* | **loopback** *loopback-id* **lo** *loopback-id*	(Optional) Displays information for a specific VLAN, loopback, or local interface. This interface must be configured for IP routing as described in Section 2.3.1.

Command Type

Router command.

Command Mode

Any router mode**.**

Command Defaults

If interface type is not specified, status information for all routing interfaces will be displayed.

Example

This example shows how to display configuration information for VLAN 1:

```
Matrix>Router1#show ip interface vlan 1
Vlan 1 is Oper DOWN
Frame Type ARPA
MAC-Address 0001.f4da.2cba
Incoming Access List is not Set
Outgoing Access List is not Set
IP Helper Address is not Set
MTU is 1500 bytes
ARP Timeout is 14400 seconds
Proxy Arp is Enabled
Gratuitous arp learning is not set
ICMP Re-Directs are enabled
ICMP Unreachables are always sent
ICMP Mask Replies are always sent
Policy routing disabled
```

Table 11-2 provides an explanation of the command output.

Table 11-2 show ip interface Output Details

Output	What It Displays...
Vlan | Lpbk | Lo *N*	Whether the interface is administratively and operationally up or down.
IP Address	Interface's IP address and mask. Set using the **ip address** command as described in Section 11.2.1.5.
Frame Type	Encapsulation type used by this interface. Set using the **arp** command as described in Section 11.2.4.2.
MAC-Address	MAC address mapped to this interface. Set using the **ip mac-address** command as described in Section 11.2.4.6.
Incoming | Outgoing Access List	Whether or not an access control list (ACL) has been configured on this interface using the commands described in Section 13.3.12.
IP Helper Address	Whether or not an IP address has been designated for forwarding UDP datagrams from this interface. Set using the **ip helper-address** command as described in Section 11.2.5.3
MTU	Interface's Maximum Transmission Unit size.
ARP Timeout	Duration for entries to stay in the ARP table before expiring. Set using the **arp timeout** command as described in Section 11.2.4.7.
Proxy Arp	Whether or not proxy ARP is enabled or disabled for this interface. Set using the **ip proxy arp** command as described in Section 11.2.4.5.
ICMP	ICMP (ping) settings. By default, ICMP messaging is enabled on a routing interface for both echo-reply and mask-reply modes. If, for security reasons, ICMP has been disabled, it can be re-enabled using the **ip icmp** command as described in Section 11.2.6.6.
Policy routing	Whether or not policy-based routing has been configured on this interface as described in Section 13.3.13.

11.2.1.5 ip address

Use this command to set, remove, or disable a primary or secondary IP address for an interface. Each Matrix Series routing module or standalone device supports up to 96 routing interfaces, with up to 50 secondary addresses (200 maximum per router) allowed for each primary IP address.

ip address *ip-address ip-mask* [**secondary**]

Syntax Description

ip-address	Specifies the IP address of the interface to be added or removed.
ip-mask	Specifies the mask for the associated IP subnet.
secondary	(Optional) Specifies that the configured IP address is a secondary address.

Command Syntax of the "no" Form

The "no" form of this command removes the specified IP address and disables the interface for IP processing.

no ip address *ip-address ip-mask*

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

If **secondary** is not specified, the configured address will be the primary address for the interface.

Example

This example sets the IP address to 192.168.1.1 and the network mask to 255.255.255.0 for VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip address 192.168.1.1 255.255.255.0
```

11.2.1.6 no shutdown

Use this command to enable an interface for IP routing and to allow the interface to automatically be enabled at device startup.

no shutdown

Syntax Description

None.

NOTE: The **shutdown** form of this command disables an interface for IP routing.

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable VLAN 1 for IP routing:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#no shutdown
```

11.2.2 Managing Router Configuration Files

Each Matrix Series device provides a single configuration interface which allows you to perform both switch and router configuration with the same command set. When a redundancy license is available and has been activated, the device also provides redundant, distributed copies of each router configuration in the event that DFE modules are added or removed from the Matrix chassis. This section demonstrates managing configuration files while operating in router mode only. For a sample of how to use these commands interchangeably with the Matrix Series single configuration interface commands, refer to Section 11.2.3.

Purpose

To review and save the current router configuration, and to disable IP routing.

Commands

The commands used to review and save the router configuration are listed below and described in the associated section as shown:

- show running-config (Section 11.2.2.1)
- write (Section 11.2.2.2)
- no ip routing (Section 11.2.2.3)

11.2.2.1 show running-config

Use this command to display the non-default, user-supplied commands entered while configuring the device.

show running-config

Syntax Description

None.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

None.

Example

This example shows how to display the current router operating configuration:

```
Matrix>Router1#show running-config
!
router id 192.168.100.1
!
 interface loopback 1
  ip address 192.168.100.1 255.255.255.255
  no shutdown
!
 interface vlan 10
  ip address 99.99.2.10 255.255.255.0
  no shutdown
!
 router ospf 1
  network 99.99.2.0     0.0.0.255 area 0.0.0.0
network 192.168.100.1 0.0.0.0   area 0.0.0.0
```

11.2.2.2 write

Use this command to save or delete the router running configuration, or to display it to output devices.

write [**erase** | **file** [**filename** *config-file*] | **terminal**]

NOTE: The **write file** command must be executed in order to save the router configuration to NVRAM. If this command is not executed, router configuration changes will not be saved upon reboot.

Syntax Description

erase	(Optional) Deletes the router-specific file.
file	(Optional) Saves the router-specific configuration to NVRAM.
filename *config-file*	(Optional) Saves the router-specific configuration to a file.
terminal	(Optional) Displays the current router-specific configuration to the terminal session.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

If no parameters are specified, the running configuration will be displayed to the terminal session.

Example

This example shows how to display the router-specific configuration to the terminal:

```
Matrix>Router1#write terminal

Enable
Config t

interface vlan 1
 iP Address 182.127.63.1 255.255.255.0
 no shutdown
interface vlan 2
 iP Address 182.127.62.1 255.255.255.0
 no shutdown
exit

router rip
network 182.127.0.0
exit
disable
exit
```

11.2.2.3 no ip routing

Use this command to disable IP routing on the device and remove the routing configuration. By default, IP routing is enabled when interfaces are configured for it as described in Section 11.2.1.

no ip routing

Syntax Description

None.

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to disable IP routing on the device:

```
Matrix>Router1(config)#no ip routing
```

11.2.3 Performing a Basic Router Configuration

11.2.3.1 Using Router-Only Config Files

Although the Matrix Series' single configuration interface provides one set of commands to perform both switch and router configuration, it is still possible to use router-only commands to configure the router. To do so, you need to add router config wrappers to your existing router config files, as shown in Figure 11-1.

Figure 11-1 Example of a Simple Matrix Series Router Config File

```
begin router 1

enable
conf t
write file
exit
disable
exit

end router 1
```

11.2.3.2 Displaying or Writing the Current Config to a File

The Matrix Series' single configuration interface allows you use the **show config** command to display or write the current router configuration to a file. For details, refer back to Section 2.2.9.3.

11.2.3.3 Configuring the Router

You can configure the router using either of the following methods.

Using a downloaded file...

1. Download a router config file to the standalone or chassis using the **copy** command as described in Section 2.2.9.5.
2. Run the **configure** command using the downloaded config file as described in Section 2.2.9.4.

Creating and saving a custom file...

1. Configure a module for routing using the **set router** command as described in Section 2.3.2.2.
2. Enable the router as described in Section 2.3.3 and configure it manually. (Refer back to Figure 11-1 for an example of a basic config file.)
3. Save the configuration using the **write file** command as described in Section 11.2.2.2.

11.2.3.4 Moving a Config File from Another Routing Module

To copy a router configuration from one module to another, proceed as follows:

1. From the routing module in which you wish to copy a config file, perform a **show config** on the file as described in Section 2.2.9.3.
2. Copy the config file to a place where it can be edited with a file editing program.
3. If you only want the router config, delete all the non-routing config elements and save the new file.
4. Change the routing instance to the module to which the config will be moved as described in Section 2.3.3.
5. Use the **copy** command to move the config file to the new module as described in Section 2.2.9.5.
6. Run the **configure** command using the new config file as described in Section 2.2.9.4.

11.2.4 Reviewing and Configuring the ARP Table

Purpose

To review and configure the routing ARP table, to enable proxy ARP on an interface, and to set a MAC address on an interface.

Commands

The commands used to review and configure the ARP table are listed below and described in the associated section as shown:

- show ip arp (Section 11.2.4.1)
- arp (Section 11.2.4.2)
- ip gratuitous-arp (Section 11.2.4.3)
- ip gratuitous-arp-learning (Section 11.2.4.4)
- ip proxy-arp (Section 11.2.4.5)
- ip mac-address (Section 11.2.4.6)
- arp timeout (Section 11.2.4.7)
- clear arp-cache (Section 11.2.4.8)

11.2.4.1 show ip arp

Use this command to display entries in the ARP (Address Resolution Protocol) table. ARP converts an IP address into a physical address.

show ip arp [*ip-address*] [**vlan** *vlan-id*] [*output-modifier*]

Syntax Description

ip-address	(Optional) Displays ARP entries related to a specific IP address.
vlan *vlan-id*	(Optional) Displays only ARP entries learned through a specific VLAN interface. This VLAN must be configured for IP routing as described in Section 2.3.1.
output-modifier	(Optional) Displays ARP entries within a specific range. Options are: • | **begin** *ip-address* — Displays only ARP entries that begin with the specified IP address. • | **exclude** *ip-address* — Excludes ARP entries matching the specified IP address. • | **include** *ip-address* — Includes ARP entries matching the specified IP address.

Configuration Mode

Any router mode.

Command Defaults

If no parameters are specified, all entries in the ARP cache will be displayed.

Example

This example shows how to use the **show ip arp** command:

```
Matrix>Router1#show ip arp
Protocol      Address          Age (min) Hardware Addr   Type      Interface
--------------------------------------------------------------------------------
Internet      134.141.235.251     0      0003.4712.7a99  ARPA      Vlan1
Internet      134.141.235.165     -      0002.1664.a5b3  ARPA      Vlan1
Internet      134.141.235.167     4      00d0.cf00.4b74  ARPA      Vlan2

Matrix>Router1#show ip arp 134.141.235.165
Protocol      Address          Age (min)  Hardware Addr Type       Interface
--------------------------------------------------------------------------------
Internet      134.141.235.165     -      0002.1664.a5b3  ARPA      Vlan2

Matrix>Router1#show ip arp vlan 2
Protocol      Address          Age (min) Hardware Addr Type        Interface
--------------------------------------------------------------------------------
Internet      134.141.235.251     0      0003.4712.7a99 ARPA       Vlan2
```

Table 11-3 provides an explanation of the command output.

Table 11-3 show ip arp Output Details

Output	What It Displays...
Protocol	ARP entry's type of network address.
Address	Network address mapped to the entry's MAC address.
Age (min)	Interval (in minutes) since the entry was entered in the table.
Hardware Addr	MAC address mapped to the entry's network address.
Type	Encapsulation type used for the entry's network address.
Interface	Interface (VLAN or loopback) through which the entry was learned.

11.2.4.2 arp

Use this command to add or remove permanent (static) ARP table entries. Up to 1,000 static ARP entries are supported per Matrix Series routing module or standalone device. A multicast MAC address can be used in a static ARP entry.

arp *ip-address mac-address* **arpa**

Syntax Description

ip-address	Specifies the IP address of a device on the network. Valid values are IP addresses in dotted decimal notation.
mac-address	Specifies the 48-bit hardware address corresponding to the *ip-address* expressed in hexadecimal notation.
arpa	Specifies ARPA as the type of ARP mapping.

Command Syntax of the "no" Form

The "no" form of this command removes the specified permanent ARP entry:

no arp *ip-address*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to add a permanent ARP entry for the IP address 130.2.3.1 and MAC address 0003.4712.7a99:

```
Matrix>Router1(config)#arp 130.2.3.1 0003.4712.7a99 arpa
```

11.2.4.3 ip gratuitous-arp

Use this command to override the normal ARP updating process, that occurs by default.

ip gratuitous-arp {**ignore** | **reply** | **request**}

Syntax Description

ignore	Ignore all gratuitous ARP frames, no updates will occur. This option will also prevent any new learning from gratuitous arps, if the command **ip gratuitous-arp-learning** was used.(Section 11.2.4.4).
reply	Update from gratuitous arp reply only.
request	Update from gratuitous arp request only.

Command Syntax of the "no" Form

The "no" form of this command resumes default ARP processing as described in RFC 826, update an existing ARP entry from either a gratuitous ARP reply or request.

no ip gratuitous-arp

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable ARP updating from gratuitous ARP requests on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip gratuitous-arp request
```

11.2.4.4 ip gratuitous-arp-learning

Use this command to allow an interface to learn new ARP bindings using gratuitous ARP. This command will be in effect if the i**p gratuitous-arp ignore** command (Section 11.2.4.3) is used. There will be no learning from gratuitous ARP frames, even with the **ip gratuitous-arp-learning** command enabled.

ip gratuitous-arp-learning {**both** | **reply** | **request**}

Syntax Description

both | **reply** | **request**	Allows learning from gratuitous ARP reply, ARP request, or from both the ARP reply and request.

Command Syntax of the “no” Form

The “no” form of this command disables gratuitous ARP learning:

no ip gratuitous-arp-learning

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable gratuitous ARP learning for both requests and replies on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip gratuitous-arp-learning both
```

11.2.4.5 ip proxy-arp

Use this command to enable proxy ARP on an interface. This variation of the ARP protocol allows the routing module to send an ARP response on behalf of an end node to the requesting host. Proxy ARP can lessen bandwidth use on slow-speed WAN links. It is enabled by default.

ip proxy-arp

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command disables proxy ARP:

no ip proxy-arp

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable proxy ARP on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip proxy-arp
```

11.2.4.6 ip mac-address

Use this command to set a MAC address on an interface.

ip mac-address *address*

NOTE: By default, every routing interface uses the same MAC address. If the user needs interfaces to use different MAC addresses, this command will allow it. It is the user's responsibility to select a MAC address that will not conflict with other devices on the VLAN since the Matrix Series device will not automatically detect this conflict.

Syntax Description

address	Specifies a 48-bit MAC address in hexadecimal format.

Command Syntax of the "no" Form

The "no" form of this command clears the MAC address:

no ip mac-address

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set an IP MAC address of 000A.000A.000B. on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip mac-address 000A.000A.000B
```

11.2.4.7 arp timeout

Use this command to set the duration (in seconds) for entries to stay in the ARP table before expiring. The device can support up to 2000 outstanding unresolved ARP entries.

arp timeout *seconds*

Syntax Description

seconds	Specifies the time in seconds that an entry remains in the ARP cache. Valid values are **0** - **65535**. A value of 0 specifies that ARP entries will never be aged out.

Command Syntax of the "no" Form

The "no" form of this command restores the default value of 14,400 seconds:

no arp timeout *seconds*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to set the ARP timeout to 7200 seconds:

```
Matrix>Router1(config)#arp timeout 7200
```

11.2.4.8 clear arp-cache

Use this command to delete all nonstatic (dynamic) entries from the ARP table.

clear arp-cache

Syntax Description

None.

Configuration Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Example

This example shows how to delete all dynamic entries from the ARP table:

```
Matrix>Router1#clear arp-cache
```

11.2.5 Configuring Broadcast Settings

Purpose

To configure IP broadcast settings.

Commands

The commands used to configure IP broadcast settings are listed below and described in the associated section as shown:

- ip directed-broadcast (Section 11.2.5.1)
- ip forward-protocol (Section 11.2.5.2)
- ip helper-address (Section 11.2.5.3)

11.2.5.1 ip directed-broadcast

Use this command to enable or disable IP directed broadcasts on an interface.

ip directed-broadcast

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command disables IP directed broadcast globally:

no ip directed-broadcast

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable IP directed broadcasts on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip directed-broadcast
```

11.2.5.2 ip forward-protocol

Use this command to enable UDP broadcast forwarding and specify which protocols will be forwarded. This command works in conjunction with the **ip helper-address** command to configure UDP broadcast forwarding. For information on specifying a new destination for UDP broadcasts, refer to Section 11.2.5.3.

ip forward-protocol {**udp** [*port*]}

Syntax Description

udp	Specifies UDP as the IP forwarding protocol.
port	(Optional) Specifies a destination port that controls which UDP services are forwarded. If not specified, the forwarding protocols are forwarded on the default ports listed: • Trivial File Transfer Protocol (TFTP) (port69) • Domain Naming System (port 53) • Time service (port 37) • NetBIOS Name Server (port 137) • NetBIOS Datagram Server (port 138) • TACACS service (port 49) • EN-116 Name Service (port 42) **NOTE:** If a certain service exists inside the node, and there is no need to forward the request to remote networks, the "no" form of this command should be used to disable the forwarding for the specific port. Such requests will not be automatically blocked from being forwarded, just because a service for them exists in the node.

Command Syntax of the "no" Form

The "no" form of this command removes a UDP port or protocol, disabling forwarding:

no ip forward-protocol {**udp** [*port*]}

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

If *port* is not specified, default forwarding services will be performed as listed above.

Example

This example shows how to enable forwarding of Domain Naming System UDP datagrams (port 53):

```
Matrix>Router(config)#ip forward-protocol udp 53
```

About DHCP/BOOTP Relay

DHCP/BOOTP relay functionality is applied with the help of IP broadcast forwarding. A typical situation occurs when a host requests an IP address with no DHCP server located on that segment. A routing module can forward the DHCP request to a server located on another network if:

- IP forward-protocol is enabled for UDP as described in Section 11.2.5.2, and
- the address of the DHCP server is configured as a helper address on the receiving interface of the routing module forwarding the request, as described in Section 11.2.5.3.

The DHCP/BOOTP relay function will detect the DHCP request and make the necessary changes to the header, replacing the destination address with the address of the server, and the source with its own address, and send it to the server. When the response comes from the server, the DHCP/BOOTP relay function sends it to the host.

11.2.5.3 ip helper-address

Use this command to enable DHCP/BOOTP relay and the forwarding of local UDP broadcasts specifying a new destination address. This command works in conjunction with the **ip forward-protocol** command (Section 11.2.5.2), which defines the forward protocol and port number. You can use this command to add more than one helper address per interface.

ip helper-address *address*

Syntax Description

address	Specifies a destination broadcast of host address used when forwarding.

Command Syntax of the “no” Form

The “no” form of this command disables the forwarding of UDP datagrams to the specified address:

no ip helper-address *address*

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to permit UDP broadcasts from hosts on networks 191.168.1.255 and 192.24.1.255 to reach servers on those networks:

```
Matrix>Router(config)#ip forward-protocol udp
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip helper-address 192.168.1.255
Matrix>Router(config)#interface vlan 2
Matrix>Router(config-if(Vlan 2))#ip helper-address 192.24.1.255
```

11.2.6 Reviewing IP Traffic and Configuring Routes

Purpose

To review IP protocol information about the device, to review IP traffic and configure routes, to enable and send router ICMP (ping) messages, and to execute traceroute.

Commands

The commands used to review IP traffic and configure routes are listed below and described in the associated section as shown:

- show ip protocols (Section 11.2.6.1)
- show ip traffic (Section 11.2.6.2)
- clear ip stats (Section 11.2.6.3)
- show ip route (Section 11.2.6.4)
- ip route (Section 11.2.6.5)
- ip icmp (Section 11.2.6.6)
- ping (Section 11.2.6.7)
- traceroute (Section 11.2.6.8)

11.2.6.1 show ip protocols

Use this command to display information about IP protocols running on the device.

show ip protocols

NOTE: Enabling CIDR for RIP on the Matrix Series device requires using the no auto-summary command (as described in Section 12.2.2.16) to disable automatic route summarization.

Syntax Description

None.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

None.

Example

This example shows how to display IP protocol information. In this case, the routing protocol is RIP (Routing Information Protocol). For more information on configuring RIP parameters, refer to Section 12.2.2:

```
Matrix>Router1#show ip protocols

Routing Protocol is "rip"
  Sending updates every 30 seconds
  Next due in 19 seconds
  Invalid after 180 seconds, hold down 120, flushed after 300
  Incoming update filter list for all interfaces is not set
  Outgoing update filter list for all interfaces is not set
  Default Version Control:
  Interface         Send         Recv         Key-chain
  Vlan    1         1            1
  Vlan    2         1            1
  Routing for Networks:
    182.127.0.0
  Routing Information Sources:
  Gateway         Distance         Last Update
  Distance: (default is 1)
```

11.2.6.2 show ip traffic

Use this command to display IP traffic statistics.

show ip traffic [**softpath**]

Syntax Description

softpath	(Optional) Displays IP protocol softpath statistics. This option is used for debugging.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If **softpath** is not specified, general IP traffic statistics will be displayed.

Example

This example shows how to display IP traffic statistics:

```
Matrix>Router1#show ip traffic

IP Statistics:
  Rcvd:   10 total, 6 local destination 0 header errors
          0 unknown protocol, 0 security failures
          Frags:   0 reassembled, 0 timeouts 0 couldn't reassemble
                   0 fragmented, 0 couldn't fragment
  Bcast:  1 received, 8 sent
  Mcast:  0 received, 16 sent
  Sent:   24 generated, 0 forwarded

         0 no route
  ICMP Statistics:
    Rcvd:  4 total, 0 checksum errors, 0 redirects, 0 unreachable, 4 echo
               0 echo reply, 0 mask requests, 0 quench
               0 parameter, 0 timestamp, 0 time exceeded,
    Sent:  6 total, 0 redirects, 0 unreachable, 0 echo, 4 echo reply
               0 mask requests, 2 mask replies, 0 quench, 0 timestamp

            0 info reply, 0 time exceeded, 0 parameter problem

  UDP Statistics:
    Rcvd:  1 total, 0 checksum errors, 1 no port
    Sent:  6 total, 0 forwarded broadcasts

  TCP Statistics:
    Rcvd:  0 total, 0 checksum errors, 0 no port
    Sent:  0 total

  IGMP Statistics:
    Rcvd:  Messages 1  Errors 0
        Reports 1   Queries 0
        Leaves 0    Unknowntype 0
   Sent: OutMessages 2

  ARP Statistics:
    Rcvd:  1 requests, 0 replies, 0 others
    Sent:  0 requests, 1 replies
```

11.2.6.3 clear ip stats

Use this command to clear all IP traffic counters (IP, ICMP, UDP, TCP, IGMP, and ARP).

clear ip stats

Syntax Description

None.

Configuration Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Example

This example shows how to clear all IP traffic counters:

```
Matrix>Router1#clear ip stats
```

11.2.6.4 show ip route

Use this command to display information about IP routes.

show ip route [*destination prefix destination prefix mask* **longer-prefixes** | **connected** | **ospf** | **rip** | **static** | **summary**]

NOTES: When there is more than one routing module configured in a Matrix chassis, each module will create and maintain its own route tables.

Routes are managed by the RTM (Route Table Manager), and are contained in the RIB (Route Information Base). This database contains all the active static routes, all the RIP routes, and up to three best routes to each network as determined by OSPF.

The RTM selects up to three of the best routes to each network and installs these routes in the FIB (Forwarding Information Base). The routes in the FIB are distributed to every module for use by the router's distributed forwarding engine on the ingress module as frames are received.

Syntax Description

destination prefix destination prefix mask **longer-prefixes**	(Optional) Converts the specified address and mask into a prefix and displays any routes that match the prefix.
connected	(Optional) Displays connected routes.
ospf	(Optional) Displays routes configured for the OSPF routing protocol. For details on configuring OSPF, refer to Section 12.2.3.
rip	(Optional) Displays routes configured for the RIP routing protocol. For details on configuring RIP, refer to Section 12.2.2.
static	(Optional) Displays static routes.
summary	(Optional) Displays a summary of the IP routing table.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If no parameters are specified, all IP route information will be displayed.

Example

This example shows how to display all IP route information. In this case, there are routes directly connected to VLANs 1 and 2, two static routes connected to VLAN 1 (one indirectly, and one via another network IP), and one RIP route. Distance/cost is displayed as [x/y]:

```
Matrix>Router1#show ip route
Codes: C -  connected, S -  static,  R - RIP, O - OSPF, IA - OSPF inter area, N1
- OSPF NSSA external type 1, N2 - OSPF NSSA external type 2, E1 - OSPF external
type 1, E2 - OSPF external type 2, * - candidate default, U - per user static
route

C         192.168.27.0/24          [    0/0001] directly connected, vlan 1
C         192.168.32.0/24          [    0/0001] directly connected, vlan 2
S          2.0.0.0/8               [   65/0001] via 192.168.72.1, vlan 1
S          3.0.0.0/8               [    0/0001] directly connected vlan 1
R          1.0.0.0/8               [   70/0002] via 192.168.72.22 vlan 1
```

11.2.6.5 ip route

Use this command to add or remove a static IP route.

ip route *prefix mask* {*forward-addr* | **vlan** *vlan-id*} [*distance*] [**permanent**] [**tag** *value*]

Syntax Description

prefix	Specifies a destination IP address prefix.
mask	Specifies a destination prefix mask.
forward-addr | **vlan** *vlan-id*	Specifies a forwarding (gateway) IP address or routing (VLAN) interface ID.
distance	(Optional) Specifies an administrative distance metric for this route. Valid values are **1** (default) to **255**. Routes with lower values receive higher preference in route selection.
permanent	(Optional) Specifies a permanent route.
tag *value*	(Optional) Specifies a tag for this route. Valid values are **1** to **4294967295**.

Command Syntax of the “no” Form

The “no” form of this command removes the static IP route:

no ip route *prefix mask* {*forward-addr* | **vlan** *vlan-id*}

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

- If *distance* is not specified, the default value of 1 will be applied.
- If **permanent** and **tag** are not specified, the route will be set as non-permanent with no tag assigned.

Examples

This example shows how to set IP address 10.1.2.3 as the next hop gateway to destination address 10.0.0.0. The route is assigned a tag of 1:

```
Matrix>Router1(config)#ip route 10.0.0.0 255.0.0.0 10.1.2.3 1
```

This example shows how to set IP address 10.1.2.3 as the next hop gateway to destination address 10.0.0.0. The route is set as permanent and assigned a tag of 20:

```
Matrix>Router1(config)#ip route 10.0.0.0 255.0.0.0 10.1.2.3 permanent tag 20
```

This example shows how to set VLAN 100 as the next hop interface to destination address 10.0.0.0:

```
Matrix>Router1(config)#ip route 10.0.0.0 255.0.0.0 vlan 100
```

11.2.6.6 ip icmp

Use this command to re-enable the Internet Control Message Protocol (ICMP), allowing a router to reply to IP ping requests. By default, ICMP messaging is enabled on a routing interface for both echo-reply and mask-reply modes. If, for security reasons, ICMP has been disabled using **no ip icmp**, this command will re-enable it on the routing interface.

ip icmp {**echo-reply** | **mask-reply**}

Syntax Description

echo-reply	Enables ICMP in echo-reply mode.
mask-reply	Enables ICMP in mask-reply mode.

Command Syntax of the "no" Form

The "no" form of this command disables ICMP:

no ip icmp {**echo-reply** | **mask-reply**}

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable ICMP in echo-reply mode on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip icmp echo-reply
```

11.2.6.7 ping

Use this command to test routing network connectivity by sending IP ping requests. The ping utility (IP ping only) transmits a maximum of five echo requests, with a packet size of 100. The application stops when the response has been received, or after the maximum number of requests has been sent.

ping *ip-address*

Syntax Description

ip-address	Specifies the IP address of the system to ping.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Examples

This example shows output from a successful ping to IP address 182.127.63.23:

```
Matrix>Router1#ping 182.127.63.23
Reply from 182.127.63.23
Reply from 182.127.63.23
Reply from 182.127.63.23

------ PING 182.127.63.23 : Statistics ------
 3 packets transmitted, 3 packets received, 0% packet loss
```

This example shows output from an unsuccessful ping to IP address 182.127.63.24:

```
Matrix>Router1#ping 182.127.63.24
Timed Out
Timed Out
Timed Out

 ------ PING 182.127.63.24 : Statistics ------
 3 packets transmitted, 0 packets received, 100% packet loss
```

11.2.6.8 traceroute

Use this command to display a hop-by-hop path through an IP network from the device to a specific destination host. Three ICMP probes will be transmitted for each hop between the source and the traceroute destination.

traceroute *host*

Syntax Description

host	Specifies a host to which the route of an IP packet will be traced.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Examples

This example shows how to use traceroute to display a round trip path to host 192.167.252.46. In this case, hop 1 is an unnamed router at 192.167.201.2, hop 2 is "rtr10" at 192.4.9.10, hop 3 is "rtr43" at 192.167.208.43, and hop 4 is back to the host IP address. Round trip times for each of the three ICMP probes are displayed before each hop. Probe time outs are indicated by an asterisk (*):

```
Matrix>Router1#traceroute 192.167.225.46
Traceroute to 192.167.225.46, 30 hops max, 40 byte packets
1  10.00 ms  20.00 ms  20.00 ms  192.167.201.2 []
2  20.00 ms  20.00 ms  20.00 ms  192.4.9.10 [enatel-rtr10.enatel.com]
3  240.00 ms  *         480.00 ms  192.167.208.43 [enatel-rtr43.enatel.com]
4  <1 ms     *         20.00 ms  192.167.225.46 [enatel-rtr46.enatel.com]

TraceRoute Complete
```

11.2.7 Configuring PIM

*** Advanced License Required ***

PIM is an advanced routing feature that must be enabled with a license key. If you have purchased an advanced license key, and have enabled routing on the device, you must activate your license as described back in Section 2.2.4 in order to enable the PIM command set. If you wish to purchase an advanced routing license, contact Enterasys Networks Sales.

Purpose

To review and configure Protocol Independent Multicast (PIM).

Commands

The commands used to review and configure PIM are listed below and described in the associated section as shown:

- ip pim sparse mode (Section 11.2.7.1)
- ip pim bsr-candidate (Section 11.2.7.2)
- ip pim dr-priority (Section 11.2.7.3)
- ip pim rp-address (Section 11.2.7.4)
- ip pim rp-candidate (Section 11.2.7.5)
- show ip pim bsr (Section 11.2.7.6)
- show ip pim interface (Section 11.2.7.7)
- show ip pim neighbor (Section 11.2.7.8)
- show ip pim rp (Section 11.2.7.9)
- show ip pim rp-hash (Section 11.2.7.10)
- show ip mroute (Section 11.2.7.11)
- show ip mforward (Section 11.2.7.12)

11.2.7.1 ip pim sparse mode

Use this command to enable Protocol Independent Multicast (PIM) Sparse Mode (SM) on a routing interface.

ip pim sparse-mode

Syntax Description

None.

Command Syntax of the "no" Form

The *no* form of this command disables PIM on an interface:

no ip pim sparse-mode

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example enables PIM sparse mode on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip pim sparse-mode
```

11.2.7.2 ip pim bsr-candidate

Use this command to enable the router to announce its candidacy as a BootStrap Router (BSR).

ip pim bsr-candidate *pim-interface* [*hash-mask-length*] [*priority*]]

Syntax Description

pim-interface	Interface of the BSR candidate. This interface must be enabled with PIM as described in Section 11.2.7.1.
hash-mask-length	(Optional) Length of a mask to be added with the group address before the hash function is called. All groups with the same seed hash correspond to the same Rendezvous Point (RP). This option provides one RP for multiple groups. **NOTE:** A *hash-mask-length* value of **30** will be automatically applied.
priority	(Optional) Specifies a BSR priority value ranging from **0** - **255**. Higher values assign higher priority. The BSR with the larger priority is preferred. If priority values are the same, the IP address breaks the tie. The BSR candidate with the higher IP address is preferred.

Command Syntax of the “no” Form

The *no* form of this command removes the router as a BSR candidate:

no ip bsr-candidate

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

- A *hash-mask-length* value of 30 will be automatically applied.
- If *priority* is not specified, **1** will be applied.

Example

This example sets the hash mask length to 30 and DR priority to 77 on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip pim bsr-candidate vlan 1 priority 77
```

11.2.7.3 ip pim dr-priority

Use this command to set the priority for which a router will be elected as the designated router (DR).

ip pim dr-priority *priority*

Syntax Description

priority	Specifies a priority value for designated router selection. Valid values are **0** - **4294967294**. Default is **1**.

Command Syntax of the "no" Form

The *no* form of this command disables the DR functionality:

no ip dr-priority

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example sets the DR priority to 20 on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip pim dr-priority 20
```

11.2.7.4 ip pim rp-address

Use this command to set a static rendezvous point (RP) for a multicast group.

ip pim rp-address *rp-address group-address group-mask* [**priority** *priority*]

Syntax Description

rp-address	Specifies the IP address of the PIM RP router.
group-address	Specifies the multicast group address.
group-mask	Specifies the multicast group mask.
priority *priority*	(Optional) Specifies an RP priority value, ranging from **0** - **255**. Lower values assign higher priority.

Command Syntax of the "no" Form

The *no* form of this command removes the static RP configuration:

no ip rp-address *rp-address group-address group-mask*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

If not specified, a *priority* value of 192 will be assigned.

Example

This example sets a static RP address at 10.0.0.1 for the multicast group at 235.0.0 255.0.0:

```
Matrix>Router1(config)#ip pim rp-address 10.0.0.1 235.0.0.0. 255.0.0.0
```

11.2.7.5 ip pim rp-candidate

Use this command to enable the router to advertise itself as a PIM candidate rendezvous point (RP) to the BSR. Only one RP candidate can be configured per routing module or standalone device.

ip pim rp-candidate *pim-interface group-address group-mask* [**priority** *priority*]

Syntax Description

pim-interface	Interface to advertise as an RP candidate. This interface must be enabled with PIM as described in Section 11.2.7.1.
group-address	Specifies the multicast group address.
group-mask	Specifies the multicast group mask.
priority *priority*	(Optional) Specifies an RP priority value, ranging from **0** - **255**. Lower values assign higher priority.

Command Syntax of the "no" Form

The *no* form of this command removes the router as an RP candidate:

no ip pim rp-candidate *pim-interface group-address group-mask*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

If not specified, a DR *priority* value of 192 will be assigned.

Example

This example enables the PIM interface at 35.0.0 224.0.0 240.0.0 to advertise itself as an RP candidate with a priority of 124:

```
Matrix>Router1(config)#ip pim rp-candidate 35.0.0.1 224.0.0.0 240.0.0.0
  priority 124
```

11.2.7.6 show ip pim bsr

Use this command to display BootStrap Router (BSR) information.

show ip pim bsr

Syntax Description

None.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Example

This example shows how to display BootStrap Router (BSR) information:

```
Matrix>Router1#show ip pim bsr

PIMv2 Elected Bootstrap Router Information:
BSR Address: 10.0.0.1
Bsr Priority: 77
Bsr Hash Mask Length: 30
Bsr Uptime: 00:01:10
Bsr Expiry: 00:00:49

This Router is a Candidate Bootstrap Router (CBSR)
Candidate BSR Address: 10.0.0.1
Hash Mask Length: 30
Priority: 77
```

Table 11-4 provides an explanation of the command output.

Table 11-4 show ip pim bsr Output Details

Output	What It Displays...
BSR Address	IP address of the bootstrap router.
BSR Priority	Priority as set by the **ip pim bsr-candidate** command.

Table 11-4 show ip pim bsr Output Details (Continued)

Output	What It Displays...
BSR Hash Mask Length	Length of a mask (32 bits maximum) that is to be added with the group address before the hash function is called. This value is configured by the **ip pim bsr-candidate** command.
BSR Uptime	Interval that this router has been up (in hours:minutes:seconds). After 24 hours, format will change into days:hours and, after a week, will change into weeks:days.
BSR Expiry	Period in which the next bootstrap message is due from this BSR (in hours:minutes:seconds). After 24 hours, format will change into days:hours and, after a week, will change into weeks:days. Assigning a time value of 00:00:00 means this BSR will not expire.

11.2.7.7 show ip pim interface

Use this command to display information about PIM interfaces that are currently up (not shutdown).

show ip pim interface [*interface*]

Syntax Description

interface	(Optional) Displays information about a specific PIM interface. This interface must be enabled with PIM as described in Section 11.2.7.1.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

If not specified, information about all PIM interfaces will be displayed.

Example

This example shows how to display PIM interface information

```
Matrix>Router1#show ip pim interface

Address         Vlan    Ver/Mode Nbr-Count Query-Intvl DR-Prior     DR
-------------------------------------------------------------------------------
 35.0.0.1         35       v2/S     1          30          1       35.0.0.2
 23.0.0.1         23       v2/S     0          30          1       23.0.0.1
 20.0.0.2         20       v2/S     0          30          1       20.0.0.2
 10.0.0.1         10       v2/S     2          30          87      10.0.0.1
```

Table 11-5 provides an explanation of the command output.

Table 11-5 show ip pim interface Output Details

Output	What It Displays...
Address	IP address of the PIM interface.
Vlan	VLAN ID of the PIM interface.
Ver/Mode	Version and mode (sparse or dense) of PIM running on the interface.

Table 11-5 show ip pim interface Output Details (Continued)

Output	What It Displays...
Nbr-Count	Total number of PIM neighbors on the interface, discovered by receiving PIM hello messages from other PIM routers on the interface.
Query-Intvl	Interval between Hello messages. Default is 30 seconds.
DR-Prior	Designated router priority value on the interface. Set with the **ip pim dr-priority** command (Section 11.2.7.3).
DR	IP address of the designated router on the LAN.

11.2.7.8 show ip pim neighbor

Use this command to display information about discovered PIM neighbors.

show ip pim neighbor [*interface*]

Syntax Description

interface	(Optional) Displays information about a specific PIM interface. This interface must be enabled with PIM as described in Section 11.2.7.1.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

If not specified, information about all PIM interfaces will be displayed.

Example

This example shows how to display PIM neighbor information:

```
Matrix>Router1#show ip pim neighbor

Neighbor Address    Vlan    DR Priority    Uptime      Expires       Mode
-------------------------------------------------------------------------
10.0.0.2            10      1              00:03:34    00:01:40    PIMSM_MODE (DR)
```

Table 11-6 provides an explanation of the command output.

Table 11-6 show ip pim neighbor Output Details

Output	What It Displays...
Neighbor Address	IP address of the PIM neighbor.
Vlan	VLAN ID of the PIM interface.
DR Priority	DR priority of the neighbor.
Uptime	Interval in hours, minutes, and seconds the entry has been in the PIM neighbor table.

Table 11-6 show ip pim neighbor Output Details (Continued)

Output	What It Displays...
Expires	Interval in hours, minutes, and seconds until the entry will be removed from the IP multicast routing table.
Mode	Mode in which the interface is operating.
(DR)	Indicates that this neighbor is a designated router on the LAN.

11.2.7.9 show ip pim rp

Use this command to display the active rendezvous points (RPs) that are cached with associated multicast routing entries.

show ip pim rp [**group** | **mapping** | *multicast group address*]

Syntax Description

group	(Optional) Displays active RPs for any existing multicast group(s).
mapping	(Optional) Displays all RP mappings.
multicast group address	(Optional) Displays RP information for a specific multicast group IP address.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

If no optional parameters are specified, all active RPs will be displayed.

Examples

This example shows how to display information about active RPs:

```
Matrix>Router1#show ip pim rp
Group: 225.1.2.3, RP: 192.168.41.1, uptime 07:49:53, expires 00:02:09
```

This example shows how to display RP mapping information:

```
Matrix>Router1#show ip pim rp mapping
PIM Group to RP Mapping:

    Group(s): 228.3.3.3/32
        RP: 41.41.1.1, via Static Configuration

    Group(s): 224.0.0.0/4
        RP: 192.168.41.1, Priority:   2, Expiry: 00:01:30, Uptime: 07:49:31
        RP: 192.168.91.1, Priority:   5, Expiry: 00:01:30, Uptime: 07:49:31
```

Table 11-7 provides an explanation of the command output.

Table 11-7 show ip pim rp Output Details

Output	What It Displays...
Group(s)	Address of the multicast group(s) about which to display RP data.
RP	Address of the RP for that group.
Priority	RP priority value.
Expiry	Period (in hours:minutes:seconds) in which the next bootstrap message is due from this BSR.
Uptime	Interval that this router has been up in hours:minutes:seconds.

11.2.7.10 show ip pim rp-hash

Use this command to display the rendezvous point (RP) that is being selected for a specified group.

show ip pim rp-hash *group-address*

Syntax Description

group-address	Displays information about a specific group address.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Example

This example shows how to display RP hash information:

```
Matrix>Router1#show ip pim rp-hash
RP  192.168.41.1, via  Bootstrap Router, uptime 07:50:10, expires 00:01:52
```

11.2.7.11 show ip mroute

Use this command to display the IP multicast routing table. This table shows how a multicast routing protocol, such as PIM and DVMRP, will forward a multicast packet. Information in the table includes source network/mask and upstream neighbors. For more information on configuring DVMRP, refer to Section 12.2.4.

show ip mroute [*unicast source address* | *multicast group address*] [summary]

Syntax Description

unicast source address | *multicast group address*	(Optional) Displays information about a specific unicast source address or multicast destination address.
summary	(Optional) Displays a summary of information.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If no optional parameters are specified, detailed information about all source and destination addresses will be displayed.

Example

This example shows a portion of the IP multicast routing table display. In this case, it shows there are nine source PIM sparse mode (PIMSM) multicast networks. PIMSM network 1 shows an incoming route at VLAN-999 and outgoing routes at VLANs 410, 555, 910 and 920:

```
Matrix>Router1#show ip mroute
IP Multicast Routing Table
Flags: D - Dense, S - Sparse, C - Connected, L - Local, P - Pruned
       R - RP-bit set, F - Register flag, T - SPT-bit set, J - Join SPT
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

1 of 9: PIMSM (*, 225.1.2.3), 01:52:43/00:02:33, RP 192.168.41.1, flags: SC
       Incoming interface: Vlan-999, RPF nbr 99.99.1.1
       Outgoing interface list:
         Vlan-410, Forward/Sparse, 01:52:43/00:00:00
         Vlan-555, Forward/Sparse, 01:48:54/00:02:33
         Vlan-910, Forward/Sparse, 01:52:43/00:00:00
         Vlan-920, Forward/Sparse, 01:52:43/00:00:00
```

11.2.7.12 show ip mforward

Use this command to display the IP multicast forwarding table. This table shows what multicast routes have actually been programmed into the Matrix hardware. Although redundant to the **show ip mroute** display (Section 11.2.7.11), it is a useful debugging tool if there are discrepancies between the multicast routing table and the multicast forwarding table.

show ip mforward [*unicast source address* | *multicast group address*] [summary]

Syntax Description

unicast source address | *multicast group address*	(Optional) Displays information about a specific unicast source address or multicast destination address.
summary	(Optional) Displays a summary of information.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If no optional parameters are specified, detailed information about all source and destination addresses will be displayed.

Example

This example shows a portion of the IP multicast forwarding table display:

```
Matrix>Router1#show ip mforward

IP Multicast Forwarding Table

1 of 8: (63.63.100.1/32, 225.1.2.3)
Sources: 63.63.100.1
Incoming interface: Vlan-999
Outgoing interface list:
Vlan-410, Forward/Sparse
Vlan-555, Forward/Sparse
Vlan-910, Forward/Sparse
Vlan-920, Forward/Sparse
```

11.2.8 Configuring Load Sharing Network Address Translation (LSNAT)

*** Advanced License Required ***

LSNAT is an advanced routing feature that must be enabled with a license key. If you have purchased an advanced license key, and have enabled routing on the device, you must activate your license as described back in Section 2.2.4 in order to enable the LSNAT command set. If you wish to purchase an advanced routing license, contact Enterasys Networks Sales.

About LSNAT

As defined in RFC 2391, LSNAT supports network reliability and availability by enabling high traffic servers to load balance. It allows an IP address and port number to become a Virtual IP address and port number (VIP), mapped to many devices. When the VIP is seen as a destination address and destination port number by the LSNAT device, the device traps the packet and then translates the VIP to a real IP address and port combination. It does this by using a selected algorithm for choosing from the group of servers addresses, and replaces the VIP with the selected IP address and port number. For outgoing transmissions, the translation is made from real IP address and port combination to VIP.

LSNAT Configuration Considerations

The following considerations must be taken into account when configuring LSNAT on Matrix Series devices:

- On chassis-based systems, only one router per chassis will be allowed to run LSNAT at a given time.
- ALL modules in the chassis must have upgraded memory to 256 MB, and must have an advanced license activated.
- A server farm cannot be shared by different virtual servers.
- When different virtual server IPs (VIPs) share the same real server in different server farms, the persistence level must be set the same.
- All real servers in the same server farm should be configured to use the same port.
- In general, in order to edit or delete a virtual server or real server (serverfarm) configuration, the devices must be first configured “out of service” (**no inservice**) before the changes will be allowed.

- The virtual port used by the virtual server (configured with the **virtual** command, Section 11.2.8.15) should match the real port used by the real server (configured with the **real** command, Section 11.2.8.4) in conjunction with the same virtual server, except when configuring sticky persistence. (See "Sticky Persistence Configuration Considerations" on page 11-68.)

  Choose a port number for an application that is running on the servers. For example, if Telnet is a service running on the real server, you can configure the real server port number to be 23.

Session Persistence

Load balancing clients connect to a *virtual* IP address which, in reality, is redirected to one of several physical servers in a load balancing server farm group. In many web page display applications, a client may have its requests redirected to and serviced by different servers in the group. In certain situations, however, it may be critical that all traffic for the client be directed to the same physical server for the duration of the session—this is the concept of *session persistence*.

When the router receives a new session request from a client for a specific virtual address, the router creates a *binding* between the client (source) IP address/port socket and the (destination) IP address/port socket of the load balancing server selected for this client. Subsequent packets from clients are compared to the list of bindings. If there is a match, the packet is sent to the same server previously selected for this client. If there is not a match, a new binding is created. How the router determines the binding match for session persistence is configured with the **persistence level** command when the virtual server is created.

There are three configurable levels of session persistence:

- TCP persistence — a binding is determined by the matching the source IP/port address as well as the virtual destination IP/port address. For example, requests from the client address of 134.141.176.10:1024 to the virtual destination address 207.135.89.16:80 is considered one session and would be directed to the same load balancing server (for example, the server with IP address 10.1.1.1). A request from a different source socket from the same client address to the same virtual destination address would be considered another session and may be directed to a different load balancing server (for example, the server with IP address 10.1.1.2). This is the default level of session persistence.
- SSL persistence — a binding is determined by matching the source IP address and the virtual destination IP/port address. Note that requests from *any* source socket with the client IP address are considered part of the same session. For example, requests from the client IP address of 134.141.176.10:1024 or 134.141.176.10:1025 to the virtual destination address 207.135.89.16:80 would be considered one session and would be directed to the same load balancing server (for example, the server with IP address 10.1.1.1).

- Sticky persistence — a binding is determined by matching the source and destination IP addresses only. This allows all requests from a client to the same virtual address to be directed to the same load balancing server. For example, both HTTP and HTTPS requests from the client address 134.141.176.10 to the virtual destination address 207.135.89.16 would be directed to the same load balancing server (for example, the server with IP address 10.1.1.1).

Sticky Persistence Configuration Considerations

Sticky persistence functionality provides less security but the most flexible capability for users to load balance all services through a virtual IP address. In addition, this functionality provides better resource usage by the LSNAT router, as well as better performance for the same clients trying to reach the same real servers across different services through a virtual server.

For example, with sticky persistence, HTTP, HTTPS, TELNET and SSH requests from a client (200.1.1.1) to the virtual server address (192.168.1.2) would all be directed to the same real server. The client always goes to the same real server for all the services provided by that server, and it would only require the use one binding hardware resource (instead of one per service per client).

In order to use sticky persistence, the following configuration criteria are required:

- Sticky persistence must be configured for the server farm group (with the **sticky** command) as well as for the virtual server (with the **persistence level** command).
- The real servers in this server farm are to be used for all services. The servers are not allowed to be used with other server farms to support other virtual server services. There is one exception to this rule, described in the next bullet item.
- Sticky means all TCP ports or all UDP ports on the virtual server are supported, but not both. You can create two virtual servers with different IP addresses (one for TCP protocols and one for UDP protocols/ports) and use the same real servers (with different serverfarm names). That way all TCP and UDP ports are supported by the same set of real servers.
- Port 0 in the virtual server has to be used to support this service and is reserved for this purpose.
- The service FTP configuration is not needed for this type of persistence. (See the **virtual** command, Section 11.2.8.15.)

Configuring Direct Access to Real Servers

When the LSNAT router has been configured with load balancing server farm groups, with real servers and virtual servers configured and “in service,” the real servers are protected from direct client access for **all** services. Load sharing clients can only access specific services on the real servers by means of the virtual servers configured to provide those services.

If you also want to provide direct client access to real servers configured as part of a server farm group, there are two mechanisms that can provide direct client access.

The first mechanism, configured within virtual server configuration mode with the **allow accessservers** command, allows you to identify specific clients who can set up connections directly to a real server's IP address, as well as continue to use the virtual server IP address.

The second mechanism, configured in Global configuration mode with the **ip slb allowaccess_all** command, allows all clients to directly access all services provided by real servers EXCEPT FOR those services configured to be accessed by means of a configured virtual server. The real servers are still protected from direct client access for configured services *only*. For example, using this mechanism, if you configured a load balancing server group containing "realserver1" and "realserver2" to provide HTTP service through virtual server "vserver-http," clients can only access the HTTP service on those real servers by means of the "vserver-http" virtual server. However, clients can directly access "realserver1" and "realserver2" for any services *other than* HTTP.

If you combine the two mechanisms, that is, configure **ip slb allowaccess_all** at the Global configuration mode and also configure **allow accessservers** within a virtual server's configuration mode, the clients identified with the **allow accesservers** command will have direct access to the real servers for **all** services (including those provided by a virtual server) and be blocked from using the virtual server. So for example, an "allowed" client can access "realserver1" and "realserver2" directly for all services, including HTTP, but cannot access those servers for HTTP by means of the "vserver-http" virtual server.

LSNAT Configuration Task List and Commands

Table 11-8 lists the mandatory and optional tasks and commands for configuring LSNAT on the Matrix Series device. Commands are described in the associated sections as shown.

Table 11-8 LSNAT Configuration Task List and Commands

Task	Use these commands...
Configure a server farm:	
• (Optional) Display the server farm configuration.	show ip slb serverfarms (Section 11.2.8.1)
• (Optional) Define an FTP control port.	ip slb ftpctrlport (Section 11.2.8.2)
• Specify a server farm name.	ip slb serverfarm (Section 11.2.8.3)

Table 11-8 LSNAT Configuration Task List and Commands (Continued)

Task	Use these commands...
• Specify a real server as a member of the server farm.	real (Section 11.2.8.4)
• (Optional) Specify a load balancing algorithm.	predictor (Section 11.2.8.5)
• (Optional) Configure this server farm to use sticky session persistence. (See "Sticky Persistence Configuration Considerations" on page 11-68 for more information.)	sticky (Section 11.2.8.6)
Configure a real server:	
• (Optional) Display the real server configuration.	show ip slb reals (Section 11.2.8.7)
• Enable a real server for service.	inservice (Section 11.2.8.8)
• (Optional) Configure real server error handling.	faildetect (Section 11.2.8.9)
• (Optional) Limit active connections to the real server.	maxconns (Section 11.2.8.10)
• (Optional) Specify a weight load number for the real server.	weight (Section 11.2.8.11)
Configure a virtual server:	
• (Optional) Display the virtual server configuration.	show ip slb vservers (Section 11.2.8.12)
• Specify a virtual server name.	ip slb vserver (Section 11.2.8.13)
• Associate a virtual server with a server farm.	serverfarm (Section 11.2.8.14)
• Configure a virtual server IP address (VIP).	virtual (Section 11.2.8.15)
• Enable a virtual server for service.	inservice (Section 11.2.8.16)
• (Optional) Restrict access to specific virtual server clients.	client (Section 11.2.8.17)

Table 11-8 LSNAT Configuration Task List and Commands (Continued)

Task	Use these commands...
• (Optional) Specify the type of session persistence and timeout. Default is TCP. (See "Session Persistence" on page 11-67 for more information.)	persistence level (Section 11.2.8.18)
• (Optional) Allow specific clients direct access to a real server without using LSNAT.	allow accessservers (Section 11.2.8.19)
Configure global direct access:	
• (Optional) Allow all clients to directly access all services provided by real servers EXCEPT FOR those services configured to be accessed through a configured virtual server. (See "Configuring Direct Access to Real Servers" on page 11-68 for more information.)	ip slb allowaccess_all (Section 11.2.8.20)
Display or clear server load balancing connections and statistics:	
• (Optional) Display server load balancing connections and statistics.	show ip slb conns (Section 11.2.8.21) show ip slb stats (Section 11.2.8.22)
• (Optional) Display SLB active sticky persistence connections.	show ip slb sticky (Section 11.2.8.23)
• (Optional) Clear server load balancing connections or statistics.	clear ip slb (Section 11.2.8.24)
Display and set chassis-based LSNAT limits:	
(Optional) From the switch CLI, display and set chassis-based LSNAT address translation limits. **NOTE:** These commands must be executed from the switch CLI.	show router limits (Section 11.2.8.25) set router limits (Section 11.2.8.26) clear router limits (Section 11.2.8.27)

11.2.8.1 show ip slb serverfarms

Use this command to display server load balancing server farm information.

show ip slb serverfarms [**detail** | *serverfarmname* [**detail**]]

Syntax Description

detail	(Optional) Displays detailed output for a specific server farm or for all configured server farms.
serverfarmname	Specifies a server farm name for which to display information.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If **detail** is not specified, summary information about all configured server farms will be displayed.

Example

This example shows how to display LSNAT server farm summary information:

```
Matrix Router1(config)#>show ip slb serverfarms
server-farm              predictor         status      rserver   rserver
-------------------------------------------------------------------------
matrix                   LEASTCONNECTION   ACTIVE            2         2
ftpserver                ROUNDROBIN        ACTIVE            2         2
ten                      ROUNDROBIN        ACTIVE            3         3
big                      ROUNDROBIN        ACTIVE            1         1
```

11.2.8.2 ip slb ftpctrlport

Use this command to specify an FTP control port for load balancing functionality. By default, this is port 21.

ip slb ftpctrlport *port-number*

Syntax Description

port-number	Specifies an FTP port number

Command Syntax of the "no" Form

The "no" form of this command resets the FTP control port to 21:

no ip slb ftpctrlport

Command Type

Router command.

Command Mode

Global configuration mode: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to specify port 46 as the FTP control port for server load balancing:

```
Matrix>Router1(config)#ip slb ftpctrlport 46
```

11.2.8.3 ip slb serverfarm

Use this command to identify an LSNAT server farm and enable server load balancing (SLB) server farm configuration mode.

ip slb serverfarm *serverfarmname*

Syntax Description

serverfarmname	Specifies a server farm name.

Command Syntax of the "no" Form

The "no" form of this command deletes the server farm from the LSNAT configuration:

no ip slb serverfarm *serverfarmname*

Command Type

Router command.

Command Mode

Global configuration mode: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to identify a server farm named "httpserver" and enable configuration mode for that server farm:

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#
```

11.2.8.4 real

Use this command to add a real LSNAT server to a server farm and to enable LSNAT real server configuration mode.

real *ip-address* **port** *number*

Syntax Description

ip-address	Specifies a server IP address.
port *number*	Specifies a port number for this server. Note that all real servers in the same server farm should be configured to use the same port.

NOTE: For backwards compatibility, entering a port number is optional for TCP session persistence only. However, the recommended procedure is to *always* configure a port number for a real server.

Command Syntax of the "no" Form

The "no" form of this command removes the server from the server farm:

no real *ip-address*

Command Type

Router command.

Command Mode

SLB Server Farm Configuration mode: **Matrix>Router1(config-slb-sfarm)#**

Command Defaults

If not specified, port 0 will be applied.

Example

This example shows how to add a real server at 10.1.2.3 to the server farm named "httpserver" and to configure the port number to be used for the service provided by this server.:

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#
```

11.2.8.5 predictor

Use this command to specify which load balancing algorithm to use for selecting a real server in an LSNAT server farm.

predictor [**roundrobin** | **leastconns**]

Syntax Description

roundrobin | **leastconns**	(Optional) Specifies Round Robin or Least Connections as the selection algorithm.

Command Syntax of the "no" Form

The "no" form of this command resets the selection algorithm to Round Robin:

no predictor

Command Type

Router command.

Command Mode

SLB Server Farm Configuration mode: **Matrix>Router1(config-slb-sfarm)#**

Command Defaults

If not specified, Round Robin will be used as the selection algorithm.

Example

This example shows how to specify Least Connections as the server selection algorithm for the "httpserver" server farm:

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#predictor leastconns
```

11.2.8.6 sticky

Use this command to configure sticky session persistence for this server farm. See "Sticky Persistence Configuration Considerations" on page 11-68 for more information.

This command is used in conjunction with the **persistence level sticky** command described in Section 11.2.8.18.

sticky

Syntax Description

None

Command Syntax of the "no" Form

The "no" form of this command removes this server farm using persistence sticky:

no sticky

Command Type

Router command.

Command Mode

SLB Server Farm Configuration mode: **Matrix>Router1(config-slb-sfarm)#**

Command Defaults

None

Example

This example shows how to set sticky persistence for the "lsnat" server farm:

```
Matrix>Router1(config)#ip slb serverfarm lsnat
Matrix>Router1(config-slb-sfarm)#sticky
```

11.2.8.7 show ip slb reals

Use this command to display information about the real servers.

show ip slb reals [**detail** | **serverfarm** *serverfarmname* [**detail**]]

Syntax Description

detail	(Optional) Displays detailed output for a specific server farm or for all configured server farms.
serverfarm *serverfarmname*	Specifies a server farm name for which to display information.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If **detail** is not specified, summary information about all configured server farms will be displayed.

Examples

These examples show how to display summary and detailed information about real servers in the "ten" server farm:

```
Matrix Router1(config)#>Router1>show ip slb reals
real-serv-ip:port     server-farm               type ins stat wgt maxcon  conns
-------------------------------------------------------------------------------
192.169.1.11:23       matrix                    both  IS  UP   1   N\A     0
192.169.1.10:23       matrix                    ping  IS  UP   1   2       0
192.169.2.14:21       ftpserver                 ping  IS  UP   1   N\A     0
192.169.2.13:21       ftpserver                  app  IS  UP   1   N\A     0
10.3.0.3:80           ten                       none  IS  UP   3   N\A     0
10.3.0.2:80           ten                       none  IS  UP   2   350     0
10.3.0.1:80           ten                       none  IS  UP   1   N\A     0
192.169.2.13:0        big                       ping  IS  UP   1   N\A     0
```

```
Matrix Router1(config)#>Router1>show ip slb reals serverfarm ten detail
Server Farm : ten
        Real Server IP : 10.3.0.3
                Real Server Port : 80
                Fail Detect Ping Retries:4 Ping Interval : 200
                Fail Detect App Retries:4 App Interval : 15
                Fail Detect Type : ping
                Current Connections on this real server: 0
                Current state of this real server: UP
                Maximum Connections : Unlimited
                Real Server Weight : 3
                InService

        Real Server IP : 10.3.0.2
                Real Server Port : 80
                Fail Detect Ping Retries:4 Ping Interval : 200
                Fail Detect App Retries:4 App Interval : 15
                Fail Detect Type : ping
                Current Connections on this real server: 0
                Current state of this real server: UP
                Maximum Connections : 350
                Real Server Weight : 2
                InService

        Real Server IP : 10.3.0.1
                Real Server Port : 80
                Fail Detect Ping Retries:4 Ping Interval : 200
                Fail Detect App Retries:4 App Interval : 15
                Fail Detect Type : ping
                Current Connections on this real server: 0
                Current state of this real server: UP
                Maximum Connections : Unlimited
                Real Server Weight : 1
                InService
```

Table 11-9 provides an explanation of the detailed command output.

Table 11-9 show ip slb reals Output Details

Output	What It Displays...
Server Farm	Name of the server farm associated with this server. Assigned using the **ip slb serverfarm** command as described in Section 11.2.8.3.
Real Server IP	Address of the real server(s) assigned to this server farm. Assigned using the **real** command as described in Section 11.2.8.4.
Real Server Port	Port number assigned to this server.
Fail Detect Ping/App Retries	Number of failure detection ping or TCP application retries that will result in an error condition on this server. Defaults can be changed using the **faildetect** command as described in Section 11.2.8.9.
Fail Detect Type	Whether or not the failure detection mechanism is ICMP ping, TCP application, both, or none. Assigned using the **faildetect** command as described in Section 11.2.8.9.
Current Connections	Number of active connections on this server.
Current State	Operational state of this server.
Maximum Connections	Number of maximum connections allowed on this server. Default of unlimited can be changed using the **maxconns** command as described in Section 11.2.8.10.
Real Server Weight	Weight load number of the real server. Default of 1 can be changed using the **weight** command as described in Section 11.2.8.11.
In Service / Not In Service	Whether or not this server is enabled (using the **inservice** command as described in Section 11.2.8.8).

11.2.8.8 inservice (real server)

Use this command to enable a real LSNAT server.

inservice

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command removes the real server from service:

no inservice

Command Type

Router command.

Command Mode

SLB Real Server Configuration mode: **Matrix>Router1(config-slb-real)#**

Command Defaults

None.

Example

This example shows how to enable the real server at IP 10.1.2.3 in the "httpserver" server farm:

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#inservice
```

11.2.8.9 faildetect (real server)

Use this command to configure which method (type) is used to detect whether an LSNAT server is up or down.

faildetect {**ping-int** *seconds* **ping-retries** *number* | **app-int** *seconds* **app-retries** *number* | **type** [**both** | **ping** | **app**]}

Syntax Description

ping-int *seconds*	Specifies an ICMP ping failure detection interval in seconds. Valid values are **1** - **200**. Default is 5 seconds.
ping-retries *number*	Specifies the number of times an ICMP ping failure will result in a retrial. Valid values are **1** - **200**. Default is 4.
app-int *seconds*	Specifies a TCP application failure detection interval in seconds. Default is 15 seconds.
app-retries *number*	Specifies the number of times a TCP application failure will result in a retrial. Default is 4.
type both | **ping** | **app**	Specifies that the failure detection mechanism will be ping, TCP application, that both methods will be used. This determines whether of not a real server in a server farm will be pinged for connectivity before being selected as a potential LSNAT server.

Command Syntax of the “no” Form

The “no” form of this command resets the fail detection configuration to a ping interval of 5 seconds, a TCP application interval of 15 seconds and a retry number of 4 for both ping and app retries:

no faildetect

Command Type

Router command.

Command Mode

SLB Real Server Configuration mode: **Matrix>Router1(config-slb-real)#**

Command Defaults

If not specified, **ping** will be chosen as the fail detection type.

Example

This example shows how to set the ping interval to 10 seconds and the retry number to 6 for the real server at IP 10.1.2.3 in the “httpserver” server farm:

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#faildetect ping-int 10 ping-retries 6
Matrix>Router1(config-slb-real)#inservice
```

11.2.8.10 maxconns

Use this command to limit the number of connections to a real LSNAT server.

maxconns *maximum-number*

Syntax Description

maximum-number	Specifies the maximum number of connections allowed. The default condition is unlimited number of connections.

Command Syntax of the "no" Form

The "no" form of this command removes the limit of connections to the server:

no maxconns

Command Type

Router command.

Command Mode

SLB Real Server Configuration mode: **Matrix>Router1(config-slb-real)#**

Command Defaults

None.

Example

This example shows how to limit the number of connections to 20 on the real server at IP 10.1.2.3 in the "httpserver" server farm:

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#faildetect ping-int 10 ping-retries 6
Matrix>Router1(config-slb-real)#maxconns 20
Matrix>Router1(config-slb-real)#inservice
```

11.2.8.11 weight

Use this command to specify the weight load number of a real server that is a member of an LSNAT server farm.

weight *weight-number*

Syntax Description

weight-number	Specifies the weight load number. Valid values are 1-255.

Command Syntax of the "no" Form

The "no" form of this command resets the weight load number to the default value of 1:

no weight *weight-number*

Command Type

Router command.

Command Mode

SLB Real Server Configuration mode: **Matrix>Router1(config-slb-real)#**

Command Defaults

None.

Example

This example shows how to set the weight load number to 100 on the real server at IP 10.1.2.3 in the "httpserver" server farm:

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#faildetect ping-int 10 ping-retries 6
Matrix>Router1(config-slb-real)#maxconns 20
Matrix>Router1(config-slb-real)#weight 100
Matrix>Router1(config-slb-real)#inservice
```

11.2.8.12 show ip slb vservers

Use this command to display server load balancing virtual server information.

show ip slb vservers [**detail** | *virtserver-name* [**detail**]]

Syntax Description

detail	(Optional) Displays detailed output for a specific virtual server or for all configured virtual servers.
virtserver-name	(Optional) Specifies a virtual server name for which to display information.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If no parameters are entered, summary information about all configured virtual servers will be displayed.

If **detail** is not specified, summary information will be displayed.

Examples

This example shows how to display summary information about all LSNAT virtual servers:

```
Matrix Router1(config)#>show ip slb vservers
                                vserv                persistence     service
virt-serv        vserv-ip-addr   port  server-farm  type  level ins   name
-------------------------------------------------------------------------------
telnet           192.169.10.1    23    matrix       STICKY 200   IS
wftpd            192.169.10.3    21    ftpserver    SSL   240    IS
five             3.3.3.3         80    ten          TCP   41     IS
test             192.169.10.88   80    big          TCP   240    IS   ftp
```

This example shows how to display detailed information about the “test” virtual server:

```
Matrix Router1(config)#>show ip slb vservers test detail
Virtual Server : test
Virtual Server IP : 192.168.2.2
Port : 23
Server Farm : test1
Persistence Type : TCP Level : 240
Virtual Server Protocol Type : TCP
In Service
Service Name :

client(s) allowed to use the virtual server(s)
----------------------------------------------
Virtual Server : test
Client IP/Mask : 169.254.1.1/255.255.255.0

client(s) allowed direct access to the real server(s)
-----------------------------------------------------
Virtual Server : test
Start IP to End IP : 169.254.1.1 to 169.254.1.9
```

Table 11-10 provides an explanation of the detailed command output.

Table 11-10 show ip slb vservers Output Details

Output	What It Displays...
Virtual Server	Name of the virtual server. Assigned using the **ip slb vserver** command as described in Section 11.2.8.13.
Virtual Server IP	Address of the virtual server. Assigned with the **virtual** command as described in Section 11.2.8.15.
Port	TCP or UDP port number assigned to this server.
Server Farm	Name of the server farm associated with this server. Assigned with the **serverfarm** command as described in Section 11.2.8.14.
Persistence Type	Type of binding used and time limit to allow clients to bind to an LSNAT virtual server. Set using the **persistence level** command as described in Section 11.2.8.18.
Virtual Server Protocol Type	Whether this virtual server is using the TCP or UDP protocol.

Table 11-10 show ip slb vservers Output Details (Continued)

Output	What It Displays...
In Service	Whether or not this virtual server is enabled (using the **inservice** command as described in Section 11.2.8.16).
Service Name	Whether or not the service named can also be accessed through this virtual server IP address. Configured using the **virtual** command as described in Section 11.2.8.15. Note that currently only FTP is supported.
client(s) allowed to use the virtual server(s)	Clients with permission to access this server. Set with the **client** command as described in Section 11.2.8.17.
client(s) allowed direct access to the real server(s)	Clients with permission to access this server without LSNAT translation. Set with the **allow accessservers** command as described in Section 11.2.8.19.

11.2.8.13 ip slb vserver

Use this command to identify an LSNAT virtual server and to access or enable the virtual server load balance (SLB) configuration mode.

ip slb vserver *vserver-name*

Syntax Description

vserver-name	Specifies a virtual server name.

Command Syntax of the "no" Form

The "no" form of this command deletes the virtual server from the LSNAT configuration:

no ip slb vserver *vserver-name*

Command Type

Router command.

Command Mode

Global configuration mode: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to identify a virtual server named "virtual-http" and enable configuration mode for that virtual server. Note that this example also includes the configuration of the server farm to which this virtual server will be associated.

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.1 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#exit
Matrix>Router1(config)#ip slb vserver virtual-http
Matrix>Router1(config-slb-vserver)#
```

11.2.8.14 serverfarm

Use this command to associate a virtual server with an LSNAT server farm.

serverfarm *serverfarm-name*

Syntax Description

serverfarm-name	Specifies a server farm name. Must be previously configured with the **ip slb serverfarm** command as described in Section 11.2.8.3.

Command Syntax of the "no" Form

The "no" form of this command removes the virtual server association:

no serverfarm *serverfarm-name*

Command Type

Router command.

Command Mode

SLB Virtual Server Configuration mode: **Matrix>Router1(config-slb-vserver)#**

Command Defaults

None.

Example

This example shows how to associate the virtual server named "virtual-http" to the "httpserver" server farm:

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.1 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#exit
Matrix>Router1(config)#ip slb vserver virtual-http
Matrix>Router1(config-slb-vserver)#serverfarm httpserver
```

11.2.8.15 virtual

Use this command to configure a virtual server IP address.

virtual *ip-address* {**tcp** | **udp**} *port* [**service** *service-name*]

Syntax Description

ip-address	Specifies an IP address for the virtual server.
tcp | **udp**	Specifies TCP or UDP as the protocol used by the virtual server.
port	Specifies a TCP or UDP port number (0 through 65535) or port name to be used by this virtual server. Specifying 0 indicates all ports can be used by this virtual server, and should be used only with sticky session persistence configuration. (See "Sticky Persistence Configuration Considerations" on page 11-68) The following port name keywords may be used: **ftp** — File Transfer Protocol, port 21 **telnet** — Telnet, port 23 **www** — World Wide Web, port 80
service *service-name*	(Optional) When TCP is specified, allows the specified service to also be accessed through this virtual server IP address. Currently, only **ftp** may be specified. **NOTE:** If sticky session persistence is configured with the **persistence level** command (Section 11.2.8.18), this parameter is not needed.

Command Syntax of the "no" Form

The "no" form of this command clears the virtual server configuration:

no virtual *ip-address*

Command Type

Router command.

Command Mode

SLB Virtual Server Configuration mode: **Matrix>Router1(config-slb-vserver)#**

Command Defaults

If a TCP **service** name is not specified, none will be applied.

Example

This example shows how to set the IP address and TCP port for the “virtual-http” virtual server:

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.1 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#exit
Matrix>Router1(config)#ip slb vserver virtual-http
Matrix>Router1(config-slb-vserver)#serverfarm httpserver
Matrix>Router1(config-slb-vserver)#virtual 10.1.4.5 tcp www
```

:

11.2.8.16 inservice (virtual server)

Use this command to enable a virtual LSNAT server.

inservice

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command removes the virtual server from service:

no inservice

Command Type

Router command.

Command Mode

SLB Virtual Server Configuration mode: **Matrix>Router1(config-slb-vserver)#**

Command Defaults

None.

Example

This example shows how to enable virtual server named "virtual-http":

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.1 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#exit
Matrix>Router1(config)#ip slb vserver virtual-http
Matrix>Router1(config-slb-vserver)#serverfarm httpserver
Matrix>Router1(config-slb-vserver)#virtual 10.1.4.5 tcp www
Matrix>Router1(config-slb-vserver)#inservice
```

11.2.8.17 client

Use this command to allow a specific client to use a virtual server. If no clients are specified with this command, all clients will be allowed to use a virtual server.

client *ip-address network-mask*

Syntax Description

ip-address	Specifies a client's IP address.
network-mask	Specifies a client's network mask.

Command Syntax of the "no" Form

The "no" form of this command removes permission for a client to use the virtual server:

no client *ip-address network-mask*

Command Type

Router command.

Command Mode

SLB Virtual Server Configuration mode: **Matrix>Router1(config-slb-vserver)#**

Command Defaults

None.

Example

This example shows how to allow a client at 100.12.22.42 255.255.255.0 to use the virtual server named "virtual-lsnat":

```
Matrix>Router1(config)#ip slb vserver virtual-lsnat
Matrix>Router1(config-slb-vserver)#client 100.12.22.42 255.255.255.0
```

11.2.8.18 persistence level

Use this command to set the type of binding used and the time limit to allow clients to remain bound to an LSNAT virtual server. See "Session Persistence" on page 11-67 for more information.

persistence level [**tcp | ssl | sticky**] *timeperiod*

Syntax Description

tcp | ssl | sticky	(Optional) Specifies the type of binding that is used to connect a client to a server. TCP is the default. **TCP** will bind based on four fields within the packets (source IP address, destination IP address, source port, and destination port). **SSL** will bind based on source IP address, destination IP address, and destination port. **Sticky** will configure sticky persistence based on source IP address, destination IP address. This parameter is used in conjunction with the **sticky** command described in Section 11.2.8.6
timeperiod	Specifies the time (in seconds) after which a binding connection between clients and the virtual server will be removed. Default timeout values are: TCP: 240 seconds SSL: 7200 seconds Sticky: 7200 seconds

Command Syntax of the "no" Form

The "no" form of this command resets the timeout to the default of 240 seconds for TCP, 7200 seconds for SSL, and 7200 seconds for Sticky:

no persistence level {**tcp | ssl | sticky**}

Command Type

Router command.

Command Mode

SLB Virtual Server Configuration mode: **Matrix>Router1(config-slb-vserver)#**

Command Defaults

If not specified, persistence level is set to TCP.

Examples

This example shows how to set the TCP session persistence timeout to 360 seconds on the virtual server named “virtual-http”:

```
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.1 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#exit
Matrix>Router1(config)#ip slb vserver virtual-http
Matrix>Router1(config-slb-vserver)#serverfarm httpserver
Matrix>Router1(config-slb-vserver)#virtual 10.1.4.5 tcp www
Matrix>Router1(config-slb-vserver)#persistence level tcp 360
Matrix>Router1(config-slb-vserver)#inservice
```

This example shows how to use sticky session persistence, in conjunction with the **sticky** server farm parameter.

```
Matrix>Router1(config)#ip slb serverfarm lsnat
Matrix>Router1(config-slb-sfarm)#sticky
Matrix>Router1(config-slb-sfarm)#real 10.1.2.10 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#real 10.1.2.11 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#exit
Matrix>Router1(config)#ip slb vserver virtual-lsnat
Matrix>Router1(config-slb-vserver)#serverfarm lsnat
Matrix>Router1(config-slb-vserver)#virtual 10.1.4.5 tcp 0
Matrix>Router1(config-slb-vserver)#persistence level sticky
Matrix>Router1(config-slb-vserver)#inservice
```

11.2.8.19 allow accessservers

Use this command to allow specific clients to access the load balancing real servers in a particular LSNAT server farm without address translation. Specified clients can set up connections directly to the real servers' IP addresses, as well as to the virtual server IP address (VIP).

For more information about using this command, see "Configuring Direct Access to Real Servers" on page 11-68.

allow accessservers *client-ip-start client-ip-end*

Syntax Description

client-ip-start	Specifies an IP address at the start of the range of clients to be allowed access.
client-ip-end	Specifies an IP address at the end of the range of clients to be allowed access.

Command Syntax of the "no" Form

The "no" form of this command removes non-LSNAT access permission from the specified clients:

no allow accessservers *client-ip-start client-ip-end*

Command Type

Router command.

Command Mode

SLB Virtual Server Configuration mode: **Matrix>Router1(config-slb-vserver)#**

Command Defaults

None.

Example

This example shows how to allow clients at 10.24.16.12 through 10.24.16.42 non-LSNAT access to the virtual server named "virtual-http":

```
Matrix>Router1(config)#ip slb vserver virtual-http
Matrix>Router1(config-slb-vserver)#allow accessservers 10.24.16.12 10.24.16.42
```

11.2.8.20 ip slb allowaccess_all

Use this command to allow all clients to directly access all services provided by real servers EXCEPT FOR those services configured for server load balancing. The real servers are still protected from direct client access for configured services *only*.

See "Configuring Direct Access to Real Servers" on page 11-68 for more information about using this command in conjunction with the virtual server configuration mode command **allow accessservers**.

ip slb allowaccess_all

Syntax Description

None

Command Syntax of the "no" Form

The "no" form of this command removes direct access for all clients:

no ip slb allowaccess_all

Command Type

Router command.

Command Mode

Global configuration mode: **Matrix>Router1(config)#**

Command Defaults

None.

Examples

This example shows how to allow all clients to have direct access to real servers for all services except those configured for server load balancing:

```
Matrix>Router1(config)#ip slb allowaccess_all
```

This example shows how to configure both methods of direct access to real servers. Note that the clients identified with the **allow accessservers** command will have direct access to the real servers for **all** services (including those configured for load-balancing) and be blocked from using the virtual server. All other clients will have direct access to real servers for all services except those configured for server load balancing.

```
Matrix>Router1(config)#ip slb allowaccess_all
Matrix>Router1(config)#ip slb serverfarm httpserver
Matrix>Router1(config-slb-sfarm)#real 10.1.2.1 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#real 10.1.2.3 port 80
Matrix>Router1(config-slb-real)#inservice
Matrix>Router1(config-slb-real)#exit
Matrix>Router1(config-slb-sfarm)#exit
Matrix>Router1(config)#ip slb vserver virtual-http
Matrix>Router1(config-slb-vserver)#serverfarm httpserver
Matrix>Router1(config-slb-vserver)#virtual 10.1.4.5 tcp www
Matrix>Router1(config-slb-vserver)#persistence level tcp 360
Matrix>Router1(config-slb-vserver)#allow accessservers 10.24.16.12 10.24.16.42
Matrix>Router1(config-slb-vserver)#inservice
```

11.2.8.21 show ip slb conns

Use this command to display active server load balancing connections.

show ip slb conns [**detail** | **vserver** *virtualserver* [**detail**] | **client** *client-ip* [**detail**]]

Syntax Description

detail	(Optional) Displays detailed output for a specific virtual server, a specific client, or for all configured virtual servers and clients.
vserver *virtualserver*	(Optional) Specifies a virtual server name for which to display information.
client *client-ip*	(Optional) Specifies a client IP for which to display information.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If no parameters are specified, summary information about all active connections will be displayed.

If **detail** is not specified, summary information will be displayed.

Examples

This example shows how to display summary information about active server load balancing connections:

```
Matrix>Router1#show ip slb conns

flo-id real-server-ip  client-ip       rport  cl-prt ptcl state
-----------------------------------------------------------------
7      192.169.1.10    192.168.1.137   23     1063   TCP  OUT-SERVR REPLY
6      192.169.2.13    192.168.1.137   1128    *     TCP  OUT-SERVR REPLY
5      192.169.2.13    192.168.1.137   21      *     TCP  OUT-SERVR REPLY
3      192.169.2.14    192.168.1.253   1084    *     TCP  OUT-SERVR REPLY
2      192.169.2.14    192.168.1.253   21      *     TCP  OUT-SERVR REPLY
1      192.169.1.11    192.168.1.253   23     1249   TCP  OUT-SERVR REPLY
```

This example shows how to display detailed information about active server load balancing connections:

```
Matrix>Router1#show ip slb conns detail
Connection Flow ID : 3
Real Server IP : 172.17.1.2
Client IP : 169.225.1.50
Real Server Port : 1003
Client Port : 1113
Protocol : TCP
Created Time stamp : 2004/3/24 14:34:17
Connection State : outgoing server reply state

Connection Flow ID : 2
Real Server IP : 172.17.1.2
Client IP : 169.225.1.50
Real Server Port : 21
Client Port : 1110
Protocol : TCP
Created Time stamp : 2004/3/24 14:34:07
Connection State : outgoing server reply state
```

Table 11-11 provides an explanation of the detailed command output.

Table 11-11 show ip slb conns Output Details

Output	What It Displays...
Connection Flow ID	Connection flow identifier.
Real Server IP	Address of the real server. Assigned using the **real** command as described in Section 11.2.8.4.
Client IP	Client IP address for this connection.
Real Server Port	Real server's UDP or TCP port assignment.
Client Port	Client's UDP or TCP port number assignment.
Protocol	Whether the connection protocol is TCP or UDP.
Created Time stamp	Time and date this connection was created.
Connection State	State of the connection.

11.2.8.22 show ip slb stats

Use this command to display load server balancing statistics.

show ip slb stats

Syntax Description

None.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

None.

Example

This example shows how to display server load balancing connection statistics:

```
Matrix>Router1#show ip slb stats
created conns      established conns      deleted conns
-------------------------------------------------------------
        3                  2                     1
```

11.2.8.23 show ip slb sticky

Use this command to display server load balancing active sticky connections.

show ip slb sticky [**client** *ip-address*]

Syntax Description

client *ip-address*	(Optional) Display sticky connections for a particular client.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If **client** is not specified, all server load balancing active sticky connections are displayed.

Examples

This example shows how to display all server load balancing active sticky connections.

```
Matrix>Router1#show ip slb sticky
client-ip       real-server-ip             conns            ftp-cntrl
------------------------------------------------------------------------
192.170.1.253   192.169.1.11                 *                 2
192.168.1.90    192.169.2.14                 *                 0
```

11.2.8.24 clear ip slb

Use this command to clear server load balancing counters or to remove server load balancing connections.

clear ip slb {[**counters**] [**connections** {**all** | **flowid** *flowid* | **serverfarm** *serverfarm* | **vserver** *vserver*}]}

Syntax Description

counters	Clears all server load balancing counters.
connections all | **flowid** *flowid* | **serverfarm** *serverfarm* | **vserver** *vserver*	Removes all server load balancing connections, or those associated with a specific flow-ID, server farm name, or virtual server name.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Example

This example shows how to remove all server load balancing connections:

```
Matrix>Router1#clear ip slb connections all
```

11.2.8.25 show router limits

Use this command to display LSNAT router limits.

show router limits [**lsnat-bindings**] | [**lsnat-cache]** | [**lsnat-configs**]

NOTE: This command must be executed from the switch CLI.

Syntax Description

lsnat-bindings	(Optional) Displays the LSNAT maximum bindings limit.
lsnat-cache	(Optional) Displays the LSNAT cache size limit.
lsnat-configs	(Optional) Displays the LSNAT configuration limit.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no options are specified, all router limits will be displayed.

Example

This example shows how to display the LSNAT cache size:

```
Matrix(rw)->show router limits lsnat-cache
LSNAT Cache size          -   2000  (default)
```

11.2.8.26 set router limits

Use this command to set LSNAT router limits.

set router limits [**lsnat-bindings** *lsnat-bindings*] | [**lsnat-cache** *lsnat-cache*] | [**lsnat-configs** *lsnat-configs*]

NOTE: This command must be executed from the switch CLI.

Syntax Description

lsnat-bindings *lsnat-bindings*	(Optional) Sets the LSNAT maximum bindings limit.
lsnat-cache *lsnat-cache*	(Optional) Sets the LSNAT cache size limit.
lsnat-configs *lsnat-configs*	(Optional) Sets the LSNAT configuration limit for number of server farms, virtual servers, direct access entries, real servers, and client access entries. The *lsnat-configs* value can range from 1 to 50. The number specified will have the following effect: • 1 to 50 server farms, virtual servers, and direct access entries can be configured • 10 to 500 real servers and client access entries can be configured

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

- If not specified, maximum *bindings* will be set to the default value of 5000.
- If not specified, *cache* size will be set to the default value of 1000.
- If not specified, maximum *configs* will be set to the default value of 50. That is, up to 50 server farms, 50 virtual servers, and 50 direct access entries can be

configured, and up to 500 real servers and 500 client access entries can be configured.

Example

This example shows how to set the LSNAT configuration limit to 25. This means that up to 25 server farms, 25 virtual servers, and 25 direct access entries can be configured, and up to 250 real servers and 250 client access entries can be configured.

```
Matrix(rw)->set router limits lsnat-configs 25
```

11.2.8.27 clear router limits

Use this command to reset chassis-based LSNAT limits to default values.

clear router limits [**lsnat-bindings**] | [**lsnat-cache**] | [**lsnat-configs**]

NOTE: This command must be executed from the switch CLI.

Syntax Description

lsnat-bindings	(Optional) Resets the LSNAT maximum bindings limit to the default value of 5000.
lsnat-cache	(Optional) Resets the LSNAT cache size limit to the default value of 2000.
lsnat-configs	(Optional) Resets the LSNAT configuration limit to the default value of 50.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If no options are specified, all LSNAT limits will be reset.

Example

This example shows how to reset all chassis-based LSNAT limits:

```
Matrix(rw)->clear router limits
```

11.2.9 Configuring Dynamic Host Configuration Protocol (DHCP)

DHCP Overview

The Dynamic Host Configuration Protocol (DHCP) provides services for allocating and delivering IP addresses and other configuration parameters to Internet hosts. DHCP consists of two components: a protocol for delivering host-specific configuration parameters from a DHCP server to a host, and a mechanism for allocating network addresses to hosts. Optional functionality also provides services to complete high-availability, authenticated and QoS-dependant host configuration.

The DHCP protocol is based on a client-server model in which a designated DHCP server allocates network addresses and delivers configuration parameters to dynamically configured clients. Throughout the remainder of this section, the term “server” refers to a host providing initialization parameters through DHCP, and the term “client” refers to a host requesting initialization parameters from a DHCP server.

DHCP supports the following mechanisms for IP address allocation:

- Automatic — DHCP assigns an IP address to a client for a limited period of time (or until the client explicitly relinquishes the address).
- Manual — A client's IP address is assigned by the network administrator, and DHCP is used simply to convey the assigned address to the client.

The amount of time that a particular IP address is valid for a system is called a lease. The Matrix routing module or standalone device maintains a lease database which contains information about each assigned IP address, the MAC address to which it is assigned, the lease expiration, and whether the address assignment is dynamic or static. The DHCP lease database is stored in flash memory.

Configuring DHCP

By default, the DHCP server is not enabled on the Matrix routing module or standalone device. You can selectively enable DHCP service on particular interfaces and not others. To enable DHCP service on an interface, you must first define a DHCP scope. A scope consists of a pool of IP addresses and a set of parameters for a DHCP client. The parameters are used by the client to configure its network environment, for example, the default gateway and DNS domain name.

To configure DHCP on the Matrix routing module or standalone device, you must configure an IP address pool, client parameters, and optional static IP address for a specified scope. Where several subnets are accessed through a single port, you can also define multiple scopes on the same interface and group the scopes together into a superscope.

DHCP Task List

The CLI commands for DHCP Server provide functionality for:

1. Configuring a DHCP local pool for a subnet (required)
2. Excluding IP addresses not to be assigned to the clients by the DHCP server (optional)
3. Configuring a DHCP pool (required)
4. Configuring manual bindings of IP addresses and client hardware addresses (optional)
5. Configuring a DHCP server boot file (optional)
6. Monitoring and maintaining DHCP server services (optional)
7. Enabling DHCP service on a routing interface (required)

DHCP Command Modes

Except for clear and show commands, most DHCP configuration commands can be executed in most of the DHCP command modes shown in Table 11-12. CLI examples in this section will show a command being executed in one of the appropriate DHCP configuration modes.

Table 11-12 DHCP Command Modes

Mode	Usage	Access Method	Resulting Prompt
IP Local Pool Configuration Mode	Configure a local address pool as a DHCP subnet.	Type **ip local pool** and the local pool *name* from Global Configuration Mode.	**Matrix>Router1 (ip-local-pool)#**
DHCP Pool Configuration Mode	Configure a DHCP server address pool.	Type **ip dhcp pool** and the address pool *name* from Global Configuration Mode.	**Matrix>Router1 (config-dhcp-pool)#**
DHCP Class Configuration Mode	Configure a DHCP client class.	Type **client-class** and the client class *name* from DHCP Pool or Host Configuration Mode.	**Matrix>Router1 (config-dhcp-class)#**

Table 11-12 DHCP Command Modes (Continued)

Mode	Usage	Access Method	Resulting Prompt
DHCP Host Configuration Mode	Configure DHCP host parameters.	Type **client-identifier** and the *identifier*, or **hardware-address** and an *address* from any DHCP configuration mode.	**Matrix>Router1 (config-dhcp-host)#**

Commands

The commands used to configure DHCP are listed below and described in the associated section as shown:

- ip dhcp server (Section 11.2.9.1)
- ip local pool (Section 11.2.9.2)
- exclude (Section 11.2.9.3)
- ip dhcp ping packets (Section 11.2.9.4)
- ip dhcp ping timeout (Section 11.2.9.5)
- ip dhcp pool (Section 11.2.9.6)
- domain-name (Section 11.2.9.7)
- dns-server (Section 11.2.9.8)
- netbios-name-server (Section 11.2.9.9)
- netbios-node-type (Section 11.2.9.10)
- default-router (Section 11.2.9.11)
- bootfile (Section 11.2.9.12)
- next-server (Section 11.2.9.13)
- option (Section 11.2.9.14)
- lease (Section 11.2.9.15)
- host (Section 11.2.9.16)

- client-class (Section 11.2.9.17)
- client-identifier (Section 11.2.9.18)
- client-name (Section 11.2.9.19)
- hardware-address (Section 11.2.9.20)
- show ip dhcp binding (Section 11.2.9.21)
- clear ip dhcp binding (Section 11.2.9.22)
- show ip dhcp server statistics (Section 11.2.9.23)
- clear ip dhcp server statistics (Section 11.2.9.24)

11.2.9.1 ip dhcp server

Use this command to enable DHCP server features on a routing interface.

ip dhcp server

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command disables DHCP server features on one or all routing interfaces:

no ip dhcp

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable DHCP server on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))ip dhcp server
```

11.2.9.2 ip local pool

Use this command to configure a local address pool to use as a DHCP subnet. This defines the range of IP addresses to be used by DHCP server and enables IP local pool configuration mode.

ip local pool *name subnet mask*

Syntax Description

name	Specifies a name for the local address pool.
subnet	Specifies an IP subnet for the local address pool.
mask	Specifies a subnet mask for the local address pool. Valid entries are: x.x.x.x or /x.

Command Syntax of the “no” Form

The “no” form of this command removes the local address pool:

no ip local pool *name subnet mask*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to configure a local address pool called “localpool” on IP subnet 172.20.28.0/24. Mask can also be expressed as 255.255.255.0:

```
Matrix>Router1(config)#ip local pool 172.20.28.0/24
Matrix>Router1(ip-local-pool)#
```

11.2.9.3 exclude

Use this command to exclude one or more addresses from a DHCP local address pool.

exclude *ip-address number*

Syntax Description

ip-address	Specifies the starting IP address to be excluded from this pool.
number	Specifies the number of addresses to be excluded. Valid values are **1 - 65535**.

Command Syntax of the "no" Form

The "no" form of this command removes the addresses from the list of addresses excluded from the local pool:

no exclude *ip-address number*

Command Type

Router command.

Command Mode

IP Local Pool configuration: **Matrix>Router1(ip-local-pool)#**

Command Defaults

None.

Example

This example shows how to exclude 2 IP addresses beginning with 172.20.28.254 from the "localpool" address pool:

```
Matrix>Router1(config)#ip local pool localpool
Matrix>Router1(ip-local-pool)#exclude 172.20.28.254 2
```

11.2.9.4 ip dhcp ping packets

Use this command to specify the number of packets a DHCP server sends to an IP address before assigning the address to a requesting client.

ip dhcp ping packets *number*

Syntax Description

number	Specifies the number of ping packets to be sent. Valid values are **0 - 10**. Default is **2**.

Command Syntax of the "no" Form

The "no" form of this command prevents the sever from pinging IP addresses:

no ip dhcp ping packets

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to set the number of DHCP ping attempts to 6:

```
Matrix>Router1(config)#ip dhcp ping packets 6
```

11.2.9.5 ip dhcp ping timeout

Use this command to specify the amount of time the DHCP server will wait for a ping reply from an IP address before timing out.

ip dhcp ping timeout *milliseconds*

Syntax Description

number	Specifies the ping timeout in milliseconds. Valid values are **100** to **10000**.

Command Syntax of the "no" Form

The "no" form of this command resets the ping timeout to the default value of 500:

no ip dhcp ping timeout

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to set the DHCP ping timeout to 900 milliseconds:

```
Matrix>Router1(config)#ip dhcp ping timeout 900
```

11.2.9.6 ip dhcp pool

Use this command to assign a name to a DHCP server pool of addresses, and to enable DHCP address pool configuration mode.

ip dhcp pool *name*

Syntax Description

name	Specifies a DHCP address pool name.
	NOTE: This must match the previously configured name assigned with the ip local pool command as described in Section 11.2.9.2.

Command Syntax of the "no" Form

The "no" form of this command deletes a DHCP address pool:

no ip dhcp pool *name*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to assign the name "localpool" as a DHCP address pool, and enable configuration mode for that address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#
```

11.2.9.7 domain-name

Use this command to assign a domain name to a DHCP client.

domain-name *domain*

Syntax Description

domain	Specifies a domain name string.

Command Syntax of the "no" Form

The "no" form of this command deletes a DHCP domain name:

no ip dhcp domain-name *domain*

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

None.

Example

This example shows how to assign the "mycompany.com" domain name to the "localpool" address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#domain-name mycompany.com
```

11.2.9.8 dns-server

Use this command to assign one or more DNS servers to DHCP clients.

dns-server *address* [*address2...address8*]

Syntax Description

address	Specifies the IP address of a DNS server.
address2... address8	(Optional) Specifies, in order of preference, up to 7 additional DNS server IP address(es).

Command Syntax of the "no" Form

The "no" form of this command deletes the DNS server list:

no dns-server

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

If *address2...address8* is not specified, no additional addresses will be configured.

Example

This example shows how to assign a DNS server at 11.12.1.99 to the "localpool" address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#dns-server 11.12.1.99
```

11.2.9.9 netbios-name-server

Use this command to assign one or more NetBIOS WINS servers to DHCP clients.

netbios-name-server *address* [*address2...address8*]

Syntax Description

address	Specifies the IP address of a NetBIOS WINS server.
address2... address8	(Optional) Specifies, in order of preference, up to 7 additional NetBIOS WINS server IP address(es).

Command Syntax of the "no" Form

The "no" form of this command deletes the NetBIOS WINS server list:

no netbios-name-server

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

If *address2...address8* is not specified, no additional addresses will be configured.

Example

This example shows how to assign a NetBIOS WINS server at 13.12.1.90 to the "localpool" address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#netbios-name-server 13.12.1.90
```

11.2.9.10 netbios-node-type

Use this command to assign a NetBIOS node (server) type to DHCP clients.

netbios-node-type *type*

Syntax Description

type	Specifies the NetBIOS node type. Valid values and their corresponding types are: • **h-node** — hybrid (recommended) • **b-node** — broadcast • **p-node** — peer-to-peer • **m-mode** — mixed

Command Syntax of the "no" Form

The "no" form of this command deletes the NetBIOS node type:

no netbios-node-type

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

None.

Example

This example shows how to specify hybrid as the NetBIOS node type for the "localpool" address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#netbios-node type h-node
```

11.2.9.11 default-router

Use this command to assign a default router list to DHCP clients.

default-router *address* [*address2...address8*]

Syntax Description

address	Specifies the IP address of a default router.
address2... address8	(Optional) Specifies, in order of preference, up to 7 additional default router IP address(es).

Command Syntax of the "no" Form

The "no" form of this command deletes the default router list:

no netbios-name-server

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

If *address2...address8* is not specified, no additional addresses will be configured.

Example

This example shows how to assign a default router at 14.12.1.99 to the "localpool" address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#default-router 14.12.1.99
```

11.2.9.12 bootfile

Use this command to specify the default boot image for a DHCP client.

bootfile *filename*

Syntax Description

filename	Specifies the boot image file name.

Command Syntax of the "no" Form

The "no" form of this command deletes the boot image association:

no bootfile

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

None.

Example

This example shows how to specify "dhcpboot" as the boot image file in the "localpool" address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#bootfile dhcpboot
```

11.2.9.13 next-server

Use this command to specify the next server in the DHCP server boot process. The next server is the server the client will contact for the boot file if the primary server is not able to supply it. A next server is usually specified in a manual DHCP binding configuration in order to provide an IP address to a BOOTP client and allow the client to receive the TFTP server address when downloading a boot file image.

next-server *primary-ip secondary-ip*

Syntax Description

primary-ip	Specifies the IP address of the primary DHCP server.
secondary-ip	Specifies the IP address of the secondary DHCP server.

Command Syntax of the "no" Form

The "no" form of this command removes the secondary server:

no next-server *primary-ip secondary-ip*

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

None.

Example

This example shows how to specify 10.20.42.13 as primary and 10.20.100.36 as secondary DHCP servers:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#next-server 10.20.42.13 10.20.100.36
```

11.2.9.14 option

Use this command to configure DHCP options. These configuration parameters and other control information are carried in tagged data items that are stored in the options field of the DHCP message to network hosts. For a current list of DHCP options, refer to RFC 2132.

option *code* [**instance** *number*] {**ascii** *string* | **hex** *string* | **ip** *address*}

Syntax Description

code	Specifies a DHCP option code as defined by RFC 2132.
instance *number*	(Optional) Assigns an instance number to this option. Valid values are **0** to **255**.
ascii *string* | **hex** *string* | **ip** *address*	Specifies a *code* parameter as defined by RFC 2132. An ASCII character string containing a space must be enclosed in quotations.

Command Syntax of the "no" Form

The "no" form of this command deletes one or all DHCP options:

no option *code* [**instance** *number*]

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

If **instance** is not specified, none (0) will be applied.

Examples

This example shows how to configure DHCP option 19, which specifies whether the client should configure its IP layer for packet forwarding. In this case, IP forwarding is enabled with the 01 value:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#option 19 hex 01
```

This example shows how to configure DHCP option 72, which assigns one or more Web servers for DHCP clients. In this case, two Web server addresses are configured:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#option 72 ip 168.24.3.252 168.24.3.253
```

11.2.9.15 lease

Use this command to specify the duration of the lease for an IP address assigned by a DHCP server to a client.

lease {*days* [*hours*] [*minutes*] | **infinite**}

Syntax Description

days	Specifies the number of days an address lease will remain valid.
hours	(Optional) When a *days* value has been assigned, specifies the number of hour an address lease will remain valid.
minutes	(Optional) When a *days* value has been assigned, specifies the number of minutes an address lease will remain valid.
infinite	Specifies that the duration of the lease will be unlimited.

Command Syntax of the "no" Form

The "no" form of this command resets the lease duration to the default value of 1 day (24 hours):

no lease

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

If *hours* or *minutes* are not specified, no values will be configured.

Example

This example shows how to set a one-hour lease to the "localpool" address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#lease 0 1
```

11.2.9.16 host

Use this command to specify an IP address and network mask for manual DHCP binding.

host *address* [*mask* | *prefix-length*]

Syntax Description

address	Specifies the IP address of the DHCP client.
mask | *prefix-length*	(Optional) Specifies a network mask or prefix for the IP address.

Command Syntax of the "no" Form

The "no" form of this command removes the client IP address:

no host

Command Type

Router command.

Command Mode

DHCP Pool Configuration mode: **Matrix>Router1(config-dhcp-pool)#**

Command Defaults

If not specified, DHCP server will examine its defined IP address pools for a *mask* or *prefix-length*. If no mask is found in the IP address pool database, the Class A, B, or C natural mask will be used.

Example

This example shows how to set 15.12.1.99 255.255.248.0 as the IP address and subnet mask of a client in the "localpool" address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#hardware-address 0001.f401.2710
Matrix>Router1(config-dhcp-host)#host 15.12.1.99 255.255.248.0
```

11.2.9.17 client-class

Use this command to identify an DHCP client class. Using this command to give a set of client class properties a name, allows you to assign properties to all DHCP clients within the class rather than configuring each client separately. This command also enables DHCP class configuration mode.

client-class *name*

Syntax Description

name	Specifies a name for a DHCP client class.

Command Syntax of the "no" Form

The "no" form of this command deletes a client class name:

no client-class *name*

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

None.

Example

This example shows how to assign "clientclass1" as a client class name in the "localpool" address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#client-class clientclass1
```

11.2.9.18 client-identifier

Use this command to enable DHCP host configuration mode and associate a client class with a DHCP client.

client-identifier *mac-address* [**client-class** *name*]

Syntax Description

mac-address	Specifies the client's MAC address.
client-class *name*	(Optional) Specifies the class to which this client will be assigned. Must be configured using the client-class name as described in Section 11.2.9.17.

Command Syntax of the "no" Form

The "no" form of this command deletes a client identifier:

no client-identifier *unique-identifier*

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

If **client-class** is not specified, none will be assigned.

Example

This example shows how to assign client MAC address 00.01f4.0127 within "clientclass1":

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#client-identifier 0100.01f4.0127 client-class
clientclass1
```

11.2.9.19 client-name

Use this command to assign a name to a DHCP client.

client-name *name* [**client-class** *name*]

Syntax Description

name	Specifies a name for a DHCP client. **NOTE:** The client name should not include the domain name.
client-class *name*	(Optional) Specifies the class to which this client will be assigned. Must be configured using the client-class name as described in Section 11.2.9.17.

Command Syntax of the "no" Form

The "no" form of this command deletes a client name:

no client-name *name*

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

If **client-class** is not specified, none will be assigned.

Example

This example shows how to assign "soho1" as a client name in "clientclass1":

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#client-name soho1 client-class clientclass1
```

11.2.9.20 hardware-address

Use this command to specify parameters for a new DHCP client address. This command also enables DHCP host configuration mode.

hardware-address *hardware-address* [*type*]

Syntax Description

hardware-address	Specifies the MAC address of the client's hardware platform.
type	(Optional) Specifies a hardware protocol or client class name. Valid values and their corresponding meanings are: • **1** - 10Mb Ethernet • **6** or **ieee802** - IEEE 802 networks • **client-class** *name* - Client class (configured as described in Section 11.2.9.21). • **ethernet** - 10Mb Ethernet

Command Syntax of the "no" Form

The "no" form of this command removes the hardware address:

no hardware-address *hardware-address* [*type*]

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

If *type* is not specified, Ethernet will be applied.

Example

This example shows how to specify 0001.f401.2710 as an Ethernet MAC address for the "localpool" address pool:

```
Matrix>Router1(config)#ip dhcp pool localpool
Matrix>Router1(config-dhcp-pool)#hardware-address 0001.f401.2710 ethernet
```

11.2.9.21 show ip dhcp binding

Use this command to display information about one or all DHCP address bindings.

show ip dhcp binding [*ip-address*]

Syntax Description

ip-address	(Optional) Displays bindings for a specific client IP address.

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

If *ip-address* is not specified, information about all address bindings will be shown.

Example

This example shows how to display the DHCP binding address parameters, including an associated Ethernet MAC addresses, lease expiration dates, type of address assignments, and whether the lease is active:

```
Matrix>(config-dhcp-pool)#show ip dhcp binding

IP address      Hardware address    Lease expiration      Type           Act.
172.28.1.249    00a0.c976.6d38      APR 09 2004 03:33PM   Automatic      Y
172.28.1.254    00a0.ccd1.12f8      Infinite              Manual         Y
```

11.2.9.22 clear ip dhcp binding

Use this command to delete one or all automatic DHCP address bindings.

clear ip dhcp binding {*address* | ***}

Syntax Description

address | *	Specifies an automatic address binding to be deleted, or that all (*) automatic bindings will be deleted.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Example

This example shows how to delete the address binding 18.12.22.99 from the DHCP server bindings database:

```
Matrix>Router1#clear ip dhcp binding 18.12.22.99
```

11.2.9.23 show ip dhcp server statistics

Use this command to display DHCP server statistics.

show ip dhcp server statistics

Syntax Description

None.

Command Type

Router command.

Command Mode

Any DHCP configuration mode.

Command Defaults

None.

Example

This example shows how to display DHCP server statistics:

```
Matrix>Router1#show ip dhcp server statistics

Memory usage            614874
Address pools           3
Database agents         0
Automatic bindings      1
Manual bindings         1
Expired bindings        1
Malformed messages      0

Message                 Received
BOOTREQUEST             0
DHCPDISCOVER            0
DHCPREQUEST             646
DHCPDECLINE             0
DHCPRELEASE             0
DHCPINFORM              0

Message                 Sent
BOOTREPLY               0
DHCPOFFER               0
DHCPACK                 646
DHCPNAK                 0
```

Table 11-13 provides an explanation of the command output.

Table 11-13 show ip dhcp server statistics Output Details

Output	What It Displays...
Memory usage	Bytes of RAM allocated by the DHCP server.
Address pools	Configured address pools in the DHCP database.
Database agents	Agents configured in the DHCP database.
Automatic bindings	IP addresses that have been automatically mapped to the Ethernet MAC addresses of hosts found in the DHCP database.
Manual bindings	IP addresses that have been manually mapped to the Ethernet MAC addresses of hosts found in the DHCP database.
Expired bindings	Number of expired leases.
Malformed messages	Number of truncated or corrupted messages e received by the DHCP server.
Message	Message type received by the DHCP server.
Received	Number of messages received by the DHCP server.
Sent	Number of messages sent by the DHCP server.

11.2.9.24 clear ip dhcp server statistics

Use this command to reset all DHCP server counters.

clear ip dhcp server statistics

Syntax Description

None.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Example

This example shows how to reset all DHCP server counters:

```
Matrix>Router1#clear ip dhcp server statistics
```

12

Routing Protocol Configuration

This chapter describes the Routing Protocol Configuration set of commands and how to use them.

ROUTER: The commands covered in this chapter can be executed only when the device is in router mode. For details on how to enable router configuration modes, refer to Section 2.3.3.

12.1 PROCESS OVERVIEW: ROUTING PROTOCOL CONFIGURATION

Use the following steps as a guide to configuring routing protocols on the device:

1. Activating advanced routing features (Section 12.2.1)
2. Configuring RIP (Section 12.2.2)
3. Configuring OSPF (Section 12.2.3)
4. Configuring DVMRP (Section 12.2.4)
5. Configuring IRDP (Section 12.2.5)
6. Configuring VRRP (Section 12.2.6)

NOTE: The command prompts used in examples throughout this guide show a system where module (or standalone device) 1 and VLAN 1 have been configured for routing. The prompt changes depending on your current configuration mode, the specific module, and the interface types and numbers configured for routing on your system.

12.2 ROUTING PROTOCOL CONFIGURATION COMMAND SET

12.2.1 Activating Advanced Routing Features

In order to enable advanced routing protocols, such as OSPF and extended ACLs, on a Matrix Series device, you must purchase and activate a license key. If you have purchased an advanced routing license, and have enabled routing on the device as described in previous chapters, you can activate your license as described back in Section 2.2.4. If you wish to purchase an advanced routing license, contact Enterasys Networks Sales.

12.2.2 Configuring RIP

Purpose

To enable and configure the Routing Information Protocol (RIP).

RIP Configuration Task List and Commands

Table 12-1 lists the tasks and commands associated with RIP configuration. Commands are described in the associated section as shown.

NOTE: Enabling RIP with the **router rip** and **network** commands is required if you want to run RIP on the device. All other tasks are optional.

Table 12-1 RIP Configuration Task List and Commands

To do this...	Use these commands...
Enable RIP configuration mode and associate a network.	router rip (Section 12.2.2.1)
	network (RIP) (Section 12.2.2.2)
Allow unicast updates by defining a neighboring router.	neighbor (RIP) (Section 12.2.2.3)
Configure an administrative distance.	distance (Section 12.2.2.4)
Apply offsets to RIP routing metrics.	ip rip offset (Section 12.2.2.5)
Adjust timers.	timers (Section 12.2.2.6)

Table 12-1 RIP Configuration Task List and Commands (Continued)

To do this...	Use these commands...
Specify a RIP version.	ip rip send version (Section 12.2.2.7)
	ip rip receive version (Section 12.2.2.8)
Configure RIP authentication.	key chain (Section 12.2.2.9)
	key (Section 12.2.2.10)
	key-string (Section 12.2.2.11)
	accept-lifetime (Section 12.2.2.12)
	send-lifetime (Section 12.2.2.13)
	ip rip authentication keychain (Section 12.2.2.14)
	ip rip authentication mode (Section 12.2.2.15)
Disable automatic route summarization (necessary for enabling CIDR)	no auto-summary (Section 12.2.2.16)
Disable triggered updates.	ip rip disable-triggered-updates (Section 12.2.2.17)
Disable or re-enable split horizon poison-reverse.	ip split-horizon poison (Section 12.2.2.18)
Control the processing of routing updates.	passive-interface (Section 12.2.2.19)
	receive interface (Section 12.2.2.20)
	distribute-list (Section 12.2.2.21)
Enable redistribution from non-RIP routes.	redistribute (Section 12.2.2.22)

12.2.2.1 router rip

Use this command to enable or disable RIP configuration mode.

router rip

NOTE: You must execute the **router rip** command to enable the protocol before completing many RIP-specific configuration tasks. For details on enabling configuration modes, refer to Table 2-12 in Section 2.3.3.

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command disables RIP:

no router rip

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to enable RIP:

```
Matrix>Router1#configure terminal
Matrix>Router1(config)#router rip
Matrix>Router1(config-router)#
```

12.2.2.2 network

Use this command to attach a network of directly connected networks to a RIP routing process, or to remove a network from a RIP routing process.

network *ip-address*

Syntax Description

ip-address	Specifies the IP address of a directly connected network that RIP will advertise to its neighboring routers.

Command Syntax of the "no" Form

The "no" form of this command removes the network from the RIP routing process:

no network *ip-address*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to attach network 192.168.1.0 to the RIP routing process:

```
Matrix>Router1(config)#router rip
Matrix>Router1(config-router)#network 192.168.1.0
```

12.2.2.3 neighbor

Use this command to instruct the router to send unicast RIP information to an IP address. RIP is normally a broadcast protocol. In order for RIP routing updates to reach nonbroadcast networks, the neighbor's IP address must be configured to permit the exchange of routing information.

neighbor *ip-address*

Syntax Description

ip-address	Specifies the IP address of a directly connected neighbor with which RIP will exchange routing information.

Command Syntax of the "no" Form

The "no" form of this command disables point-to-point routing exchanges:

no neighbor *ip-address*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to instruct the system to exchange routing information with neighbor 192.5.10.1:

```
Matrix>Router1(config)#router rip
Matrix>Router1(config-router)#neighbor 192.5.10.1
```

12.2.2.4 distance

Use this command to configure the administrative distance for RIP routes. If several routes (coming from different protocols) are presented to the Matrix Series Route Table Manager (RTM), the protocol with the lowest administrative distance will be chosen for route installation. By default, RIP administrative distance is set to 120. The **distance** command can be used to change this value, resetting RIP's route preference in relation to other routes as shown in the table below.

Route Source	Default Distance
Connected	0
Static	1
OSPF	110
RIP	120

distance *weight*

Syntax Description

weight	Specifies an administrative distance for RIP routes. Valid values are **1** - **255**.

Command Syntax of the "no" Form

The "no" form of this command resets RIP administrative distance to the default value of 120:

no distance [*weight*]

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to change the default administrative distance for RIP to 1001:

```
Matrix>Router1(config)#router rip
Matrix>Router1(config-router)#distance 100
```

12.2.2.5 ip rip offset

Use this command to add or remove an offset to the metric of an incoming or outgoing RIP route. Adding an offset on an interface is used for the purpose of making an interface a backup.

ip rip offset {**in** | **out**} *value*

Syntax Description

in	Applies the offset to incoming metrics.
out	Applies the offset to outgoing metrics.
value	Specifies a positive offset to be applied to routes learned via RIP. Valid values are from **0** to **16**. If the value is 0, no action is taken.

Command Syntax of the "no" Form

The "no" form of this command removes an offset:

no ip rip offset {**in** | **out**}

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

The following example shows how to add an offset of 1 to incoming RIP metrics on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip rip offset in 1
```

12.2.2.6 timers

Use this command to adjust RIP routing timers determining the frequency of routing updates, the length of time before a route becomes invalid, and the interval during which routing information regarding better paths is suppressed.

timers basic *update-seconds invalid-seconds holdown-seconds flush-seconds*

Syntax Description

basic	Specifies a basic configuration for RIP routing timers.
update-seconds	Specifies the rate (seconds between updates) at which routing updates are sent. Valid values are **0** to **4294967295**.
invalid-seconds	Specifies the interval (in seconds) after which a route is declared invalid. Valid values are **1** to **4294967295**.
holdown-seconds	Specifies the interval (in seconds) during which routing information regarding better paths is suppressed. Valid values are **0** to **4294967295**.
flush-seconds	Specifies the interval (in seconds) after which a route is deleted. Valid values are **0** to **4294967295**.

Command Syntax of the "no" Form

The "no" form of this command clears RIP timer parameters:

no timers basic

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to set RIP timers to a 5 second update time, a 10 second invalid interval, a 20 second holdown time, and a 60 second flush time:

```
Matrix>Router1(config)#router rip
Matrix>Router1(config-router)#timers basic 5 10 20 60
```

12.2.2.7 ip rip send version

Use this command to set the RIP version(s) for update packets transmitted on an interface.

ip rip send version {**1** | **2** | **r1compatible**}

Syntax Description

1	Specifies RIP version 1.
2	Specifies RIP version 2.
r1compatible	Specifies that packets be sent as version 2 packets, but transmits these as broadcast packets rather than multicast packets so that systems which only understand RIP version 1 can receive them.

Command Syntax of the "no" Form

The "no" form of this command restores the version of update packets that was transmitted by the RIP module:

no ip rip send version

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the RIP send version to 2 for packets transmitted on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip rip send version 2
```

12.2.2.8 ip rip receive version

Use this command to set the RIP version(s) for update packets accepted on the interface.

ip rip receive version {**1** | **2** | **1 2** | **none**}

Syntax Description

1	Specifies RIP version 1.
2	Specifies RIP version 2.
1 2	Specifies RIP versions 1 and 2.
none	Specifies that no RIP routes will be processed on this interface.

Command Syntax of the "no" Form

The "no" form of this command restores the default version of the RIP module update packets that are accepted on the interface:

no ip rip receive version

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the RIP receive version to 2 for update packets received on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip rip receive version 2
```

About RIP Authentication

The following tasks must be completed to configure RIP authentication on a Matrix Series routing module:

1. Create a key chain as described in Section 12.2.2.9.
2. Add a key to the chain as described in Section 12.2.2.10.
3. Specify an authentication string for the key as described in Section 12.2.2.11.
4. Set the time periods the authentication string can be received and sent as valid as described in Section 12.2.2.12 and Section 12.2.2.13.
5. Enable a key chain for use on an interface as described in Section 12.2.2.14.
6. Specify an authentication mode as described in Section 12.2.2.15.

12.2.2.9 key chain

Creates or deletes a key chain used globally for RIP authentication.

key chain *name*

Syntax Description

name	Specifies a name for the key chain.

Command Syntax of the "no" Form

The "no" form of this command deletes the specified key chain:

no key chain *name*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to create a RIP authentication key chain called "md5key":

```
Matrix>Router1(config)#key chain md5key
```

12.2.2.10 key

Use this command to identify a RIP authentication key on a key chain.

key *key-id*

NOTE: This release of the Matrix Series firmware supports only **one** key per key chain.

Syntax Description

key-id	Specifies an authentication number for a key. Valid number are from **0** to **4294967295**. Only one key is supported per key chain in this Matrix Series release.

Command Syntax of the "no" Form

The "no" form of this command removes the key from the key chain:

no key *key-id*

Command Type

Router command.

Command Mode

Key chain configuration: **Matrix>Router1(config-keychain)#**

Command Defaults

None.

Example

This example shows how to create authentication key 3 within the key chain called "md5key":

```
Matrix>Router1(config-router)#key chain md5key
Matrix>Router1(config-keychain)#key 3
```

12.2.2.11 key-string

Use this command to specify a RIP authentication string for a key. Once configured, this string must be sent and received in RIP packets in order for them to be authenticated.

key-string *text*

Syntax Description

text	Specifies the authentication string that must be sent and received in RIP packets. The string can contain from 1 to 16 uppercase and lowercase alphanumeric characters, except that the first character cannot be a number.

Command Syntax of the "no" Form

The "no" form of this command removes the authentication string:

no key-string *text*

Command Type

Router command.

Command Mode

Key chain key configuration: **Matrix>Router1(config-keychain-key)#**

Command Defaults

None.

Example

This example shows how to create an authentication string called "password" for key 3 in the "md5key" key chain:

```
Matrix>Router1(config-router)#key chain md5key
Matrix>Router1(config-keychain)#key 3
Matrix>Router1(config-keychain-key)#key-string password
```

12.2.2.12 accept-lifetime

Use this command to specify the time period during which an authentication key on a key chain is valid to be received.

accept-lifetime *start-time month date year* {**duration** *seconds* | *end-time* | **infinite**}

Syntax Description

start-time	Specifies the time of day the authentication key will begin to be valid to be received. Valid input is hours:minutes:seconds (*hh:mm:ss*)
month	Specifies the month the authentication key will begin to be valid to be received. Valid input is the first three letters of the month.
date	Specifies the day of the month the authentication key will begin to be valid to be received. Valid values, depending on the length of the month, are **1** - **31**.
year	Specifies the year the authentication key will begin to be valid to be received. Valid input is four digits up to **2035**.
duration *seconds*	Length of time (in seconds) the key is valid to be received. Valid values are **1** - **4294967295**.
end-time	Specifies the hours, minutes and seconds (*hh:mm:ss)* and the *month*, *date* and *year* from the start-time the key is valid to be received.
infinite	Specifies that the key is valid to be received from the start-time on.

Command Syntax of the "no" Form

The "no" form of this command removes the accept-lifetime configuration for an authentication key:

no accept-lifetime *start-time month date year*

Command Type

Router command.

Command Mode

Key chain key configuration: **Matrix>Router1(config-keychain-key)#**

Command Defaults

None.

Examples

This example shows how to allow the “password” authentication key to be received as valid on its RIP-configured interface beginning at 2:30 on November 30, 2002 with no ending time (infinitely):

```
Matrix>Router1(config-router)#key chain md5key
Matrix>Router1(config-keychain)#key 3
Matrix>Router1(config-keychain-key)#key-string password
Matrix>Router1(config-keychain-key)#accept-lifetime 02:30:00 nov 30 2002
  infinite
```

12.2.2.13 send-lifetime

Use this command to specify the time period during which an authentication key on a key chain is valid to be sent.

send-lifetime *start-time month date year* {**duration** *seconds* | *end-time* | **infinite**}

Syntax Description

start-time	Specifies the time of day the authentication key will begin to be valid to be sent. Valid input is hours:minutes:seconds (*hh:mm:ss*).
month	Specifies the month the authentication key will begin to be valid to be sent. Valid input is the first three letters of the month.
date	Specifies the day of the month the authentication key will begin to be valid to be sent. Valid values, depending on the length of the month, are **1 - 31**.
year	Specifies the year the authentication key will begin to be valid to be sent. Valid input is four digits up to **2035**.
duration *seconds*	Length of time (in seconds) the key is valid to be sent. Valid values are **1 - 4294967295**.
end-time	Specifies the hours, minutes and seconds (*hh:mm:ss)* and the *month*, *date* and *year* from the start-time the key is valid to be sent.
infinite	Specifies that the key is valid to be sent from the start-time on.

Command Syntax of the "no" Form

The "no" form of this command removes the send-lifetime configuration for an authentication key. Start time can be specified, but is not mandatory:

no send-lifetime [*start-time month date year*]

Command Type

Router command.

Command Mode

Key chain key configuration: **Matrix>Router1(config-keychain-key)#**

Command Defaults

None.

Example

This example shows how to allow the “password” authentication key to be sent as valid on its RIP-configured interface beginning at 2:30 on November 30, 2002 with no ending time (infinitely):

```
Matrix>Router1(config-router)#key chain md5key
Matrix>Router1(config-keychain)#key 3
Matrix>Router1(config-keychain-key)#key-string password
Matrix>Router1(config-keychain-key)#send-lifetime 02:30:00 nov 30 2002 infinite
```

12.2.2.14 ip rip authentication keychain

Use this command to enable or disable a RIP authentication key chain for use on an interface.

ip rip authentication keychain *name*

NOTE: A RIP authentication keychain must be enabled with this command before the RIP authentication mode (Section 12.2.2.15) can be configured.

Syntax Description

name	Specifies the key chain name to enable or disable for RIP authentication.

Command Syntax of the "no" Form

The "no" form of this command prevents RIP from using authentication:

no ip rip authentication keychain *name*

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Examples

This example shows how to set the RIP authentication key chain to "password" on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip rip authentication keychain password
```

12.2.2.15 ip rip authentication mode

Use this command to set the authentication mode when a key chain is present.

ip rip authentication mode {**text** | **md5**}

NOTE: The RIP authentication keychain must be enabled as described in Section 12.2.2.14 before RIP authentication mode can be configured.

Syntax Description

text	Initiates text-only authentication.
md5	Initiates MD5 authentication.

Command Syntax of the "no" Form

The "no" form of this command suppresses the use of authentication:

no ip rip authentication mode

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the authentication mode for VLAN 1 as "text":

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip rip authentication mode text
```

12.2.2.16 no auto-summary

Use this command to disable automatic route summarization. By default, RIP version 2 supports automatic route summarization, which summarizes subprefixes to the classful network boundary when crossing network boundaries. Disabling automatic route summarization enables CIDR, allowing RIP to advertise all subnets and host routing information on the Matrix Series device. To verify which routes are summarized for an interface, use the **show ip protocols** command as described in Section 11.2.6.1.

no auto-summary

NOTE: This command is necessary for enabling CIDR for RIP on the Matrix Series device.

Syntax Description

None.

Syntax to Reverse Command

This form of the command re-enables automatic route summarization:

auto-summary

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to disable RIP automatic route summarization:

```
Matrix>Router1(config)#router rip
Matrix>Router1(config-router)#no auto-summary
```

12.2.2.17 ip rip disable-triggered-updates

Use this command to prevent RIP from sending triggered updates. Triggered updates are sent when there is a change in the network and a new route with a lower metric is learned, or an old route is lost. This command stops or starts the interface from sending these triggered updates. By default triggered updates are enabled on a RIP interface.

ip rip disable-triggered-updates

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command allows RIP to respond to a request for a triggered update:

no ip rip disable-triggered-updates

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to prevent RIP from responding to a request for triggered updates on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip rip disable-triggered-updates
```

12.2.2.18 ip split-horizon poison

Use this command to enable or disable split horizon poison-reverse mode for RIP packets. Split horizon prevents packets from exiting through the same interface on which they were received. Poison-reverse explicitly indicates that a network is unreachable, rather than implying it by not including the network in routing updates.

ip split-horizon poison

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command disables split horizon poison reverse:

no ip split-horizon poison

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to disable split horizon poison reverse for RIP packets transmitted on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#no ip split-horizon poison
```

12.2.2.19 passive-interface

Use this command to prevent RIP from transmitting update packets on an interface.

passive-interface vlan *vlan-id*

NOTE: This command does not prevent RIP from monitoring updates on the interface.

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN to make a passive interface. This VLAN must be configured for IP routing as described in Section 2.3.1.

Command Syntax of the "no" Form

The "no" form of this command disables passive interface:

no passive-interface vlan *vlan-id*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to set VLAN 2 as a passive interface. No RIP updates will be transmitted on VLAN 2:

```
Matrix>Router1(config)#router rip
Matrix>Router1(config-router)#passive-interface vlan 2
```

12.2.2.20 receive-interface

Use this command to allow RIP to receive update packets on an interface. This does not affect the sending of RIP updates on the specified interface.

receive-interface vlan *vlan-id*

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN to make a receive interface. This VLAN must be configured for IP routing as described in Section 2.3.1.

Command Syntax of the "no" Form

The no use of this command denies the reception of RIP updates:

no receive-interface vlan *vlan-id*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to deny the reception of RIP updates on VLAN 2:

```
Matrix>Router1(config)#router rip
Matrix>Router1(config-router)#no receive-interface vlan 2
```

12.2.2.21 distribute-list

Use this command to filter networks received and to suppress networks from being advertised in RIP updates.

distribute-list *access-list-number* {**in vlan** *vlan-id* | **out vlan** *vlan-id*}

Syntax Description

access-list-number	Specifies the number of the IP access list. This list defines which networks are to be advertised and which are to be suppressed in routing updates. For details on how to configure access lists, refer to Section 13.3.12.
in vlan *vlan-id* | **out vlan** *vlan-id*	Applies the access list to incoming or outgoing routing updates on the specified VLAN. This VLAN must be configured for IP routing as described in Section 2.3.1.

Command Syntax of the "no" Form

The "no" form of this command removes the filter:

no distribute-list *access-list-number* {in vlan *vlan-id* | out vlan *vlan-id*}

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to suppress the network 192.5.34.0 from being advertised in outgoing routing updates:

```
Matrix>Router1(config)#access-list 1 deny 192.5.34.0 0.0.0.255
Matrix>Router1(config)#router rip
Matrix>Router1(config-router)#distribute-list 1 out vlan
```

12.2.2.22 redistribute

Use this command to allow routing information discovered through non-RIP protocols to be distributed in RIP update messages.

redistribute {**connected** | **ospf** *process-id* | **static**} [**metric** *metric value*] [**subnets**]

Syntax Description

connected	Specifies that non-RIP routing information discovered via directly connected interfaces will be redistributed.
ospf	Specifies that OSPF routing information will be redistributed in RIP.
process-id	Specifies the process ID, an internally used identification number for each instance of the OSPF routing process run on a router. Valid values are **1** to **65535**.
static	Specifies that non-RIP routing information discovered via static routes will be redistributed. Static routes are those created using the **ip route** command detailed in Section 11.2.6.5.
metric *metric value*	(Optional) Specifies a metric for the connected, OSPF or static redistribution route. This value should be consistent with the designation protocol.
subnets	(Optional) Specifies that connected, OSPF or static routes that are subnetted will be redistributed.

Command Syntax of the “no” Form

The “no” form of this command clears redistribution parameters:

no redistribute {**connected** | **ospf** *process-id* | **static**}

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

- If *metric value* is not specified, 1 will be applied.
- If **subnets** is not specified, only non-subnetted routes will be redistributed.

Example

This example shows how to redistribute routing information discovered through OSPF process ID 1 non-subnetted routes into RIP update messages:

```
Matrix>Router1(config)#router rip
Matrix>Router1(config-router)#redistribute ospf 1
```

12.2.3 Configuring OSPF

*** Advanced License Required ***

OSPF is an advanced routing feature that must be enabled with a license key. If you have purchased an advanced license key, and have enabled routing on the device, you must activate your license as described back in Section 2.2.4 in order to enable the OSPF command set. If you wish to purchase an advanced routing license, contact Enterasys Networks Sales.

Purpose

To enable and configure the Open Shortest Path First (OSPF) routing protocol.

OSPF Configuration Task List and Commands

Table 12-2 lists the tasks and commands associated with OSPF configuration. Commands are described in the associated section as shown.

NOTE: Activating your advanced routing license, and enabling OSPF with the **router ospf** and **network** commands are required if you want to run OSPF on the device. All other tasks are optional.

Table 12-2 OSPF Configuration Task List and Commands

To do this...	Use these commands...
If necessary, activate your advanced routing license.	set license (Section 2.2.4.1)
Enable OSPF configuration mode, associate a network and assign a router ID.	router ospf (Section 12.2.3.1)
	network (Section 12.2.3.2)
	router id (Section 12.2.3.3)
Configure OSPF Interface Parameters.	
• Set the cost of sending a packet on an OSPF interface.	ip ospf cost (Section 12.2.3.4)

Table 12-2 OSPF Configuration Task List and Commands (Continued)

To do this...	Use these commands...
• Set a priority to help determine the OSPF designated router for the network.	ip ospf priority (Section 12.2.3.5)
• Adjust timers and message intervals.	timers spf (Section 12.2.3.6)
	ip ospf retransmit-interval (Section 12.2.3.7)
	ip ospf transmit-delay (Section 12.2.3.8)
	ip ospf hello-interval (Section 12.2.3.9)
	ip ospf dead-interval (Section 12.2.3.10)
• Configure OSPF authentication.	ip ospf authentication-key (Section 12.2.3.11)
	ip ospf message digest key md5 (Section 12.2.3.12)
Configure OSPF Areas.	
• Configure an administrative distance.	distance ospf (Section 12.2.3.13)
• Define the range of addresses to be used by Area Boundary Routers (ABRs).	area range (Section 12.2.3.14)
• Enable area authentication.	area authentication (Section 12.2.3.15)
• Define an area as a stub area.	area stub (Section 12.2.3.16)
• Set the cost value for the default route that is sent into a stub area.	area default cost (Section 12.2.3.17)
• Define an area as an NSSA.	area nssa (Section 12.2.3.18)
Create virtual links.	area virtual-link (Section 12.2.3.19)
Enable passive OSPF mode on an interface.	passive-interface (Section 12.2.3.20)
Enable redistribution from non-OSPF routes.	redistribute (Section 12.2.3.21)

Table 12-2 OSPF Configuration Task List and Commands (Continued)

To do this...	Use these commands...
Limit link state database overflow.	database-overflow (Section 12.2.3.22)
Monitor and maintain OSPF.	show ip ospf (Section 12.2.3.23)
	show ip ospf database (Section 12.2.3.24)
	show ip ospf border-routers (Section 12.2.3.25)
	show ip ospf interface (Section 12.2.3.26)
	show ip ospf neighbor (Section 12.2.3.27)
	show ip ospf virtual-links (Section 12.2.3.28)
	clear ip ospf process (Section 12.2.3.29)
	debug ip ospf (Section 12.2.3.30)
Enable RFC1583 compatibility	rfc1583compatible (Section 12.2.3.31)

12.2.3.1 router ospf

Use this command to enable or disable Open Shortest Path First (OSPF) configuration mode.

router ospf *process-id*

NOTES: You must execute the **router ospf** command to enable the protocol before completing many OSPF-specific configuration tasks. For details on enabling configuration modes, refer to Table 2-12 in Section 2.3.3.

Only one OSPF process (*process-id*) is allowed per Matrix Series routing module or standalone device.

Syntax Description

process-id	Specifies the process ID, an internally used identification number for an OSPF routing process run on a router. Only one OSPF process is allowed per device. Valid values are **1** to **65535**.

Command Syntax of the "no" Form

The "no" form of this command disables OSPF configuration mode:

no router ospf *process-id*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to enable routing for OSPF process 1:

```
Matrix>Router1#conf terminal
Matrix>Router1(config)#router ospf 1
Matrix>Router1(config-router)#
```

12.2.3.2 network

Use this command to configure area IDs for OSPF interfaces.

network *ip-address wildcard-mask* **area** *area-id*

Syntax Description

ip-address	Specifies the IP address of an interface or a group of interfaces within the network address range.
wildcard-mask	Specifies the IP-address-type mask that includes “don't care” bits.
area *area-id*	Specifies the *area-id* to be associated with the OSPF address range. Valid values are decimal values or IP addresses. A subnet address can be specified as the *area-id* to associate areas with IP subnets.

Command Syntax of the “no” Form

The “no” form of this command removes OSPF routing for interfaces identified by the IP address and mask parameters:

no network *ip-address wildcard-mask* **area** *area-id*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to configure IP address 182.127.62.1 0.0.0.31 as OSPF area 0:

```
Matrix>Router1(config)#router ospf 1
Matrix>Router1(config-router)#network 182.127.62.1 0.0.0.31 area 0
```

12.2.3.3 router id

Use this command to set the OSPF router ID for the device. The OSPF protocol uses the router ID as a tie-breaker for path selection. If not specified, this will be set to the lowest IP address of the interfaces configured for IP routing.

router id *ip-address*

Syntax Description

ip-address	Specifies the IP address that OSPF will use as the router ID.

Command Syntax of the "no" Form

The "no" form of this command resets the router ID to the first interface configured for IP routing:

no router id

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to set the OSPF router ID to IP address 182.127.62.1:

```
Matrix>Router1(config-router)#router id 182.127.62.1
```

12.2.3.4 ip ospf cost

Use this command to set the cost of sending an OSPF packet on an interface. Each router interface that participates in OSPF routing is assigned a default cost. This command overwrites the default of 10.

ip ospf cost *cost*

Syntax Description

cost	Specifies the cost of sending a packet. Valid values range from **1** to **65535**.

Command Syntax of the "no" Form

The "no" form of this command resets the OSPF cost to the default of 10:

no ip ospf cost

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the OSPF cost to 20 for VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip ospf cost 20
```

12.2.3.5 ip ospf priority

Use this command to set the OSPF priority value for router interfaces. The priority value is communicated between routers by means of hello messages and influences the election of a designated router.

ip ospf priority *number*

Syntax Description

number	Specifies the router's OSPF priority in a range from **0** to **255**.

Command Syntax of the "no" Form

The "no" form of this command resets the value to the default of 1:

no ip ospf priority

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the OSPF priority to 20 for VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip ospf priority 20
```

12.2.3.6 timers spf

Use this command to change OSPF timer values to fine-tune the OSPF network.

timers spf *spf-delay spf-hold*

Syntax Description

spf-delay	Specifies the delay, in seconds, between the receipt of an update and the SPF execution. Valid values are **0** to **4294967295**.
spf-hold	Specifies the minimum amount of time, in seconds, between two consecutive OSPF calculations. Valid values are **0** to **4294967295**. A value of 0 means that two consecutive OSPF calculations are performed one immediately after the other.

Command Syntax of the "no" Form

The "no" form of this command restores the default timer values (5 seconds for delay and 10 seconds for holdtime):

no timers spf

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to set spf delay time to 7 seconds and hold time to 3:

```
Matrix>Router1(config)#ospf 1
Matrix>Router1(config-router)#timers spf 7 3
```

12.2.3.7 ip ospf retransmit-interval

Use this command to set the amount of time between retransmissions of link state advertisements (LSAs) for adjacencies that belong to an interface.

ip ospf retransmit-interval *seconds*

Syntax Description

seconds	Specifies the retransmit time in seconds. Valid values are **1** to **65535**.

Command Syntax of the "no" Form

The "no" form of this command resets the retransmit interval value to the default, 5 seconds:

no ip ospf retransmit-interval

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the OSPF retransmit interval for VLAN 1 to 20:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip ospf retransmit-interval 20
```

12.2.3.8 ip ospf transmit-delay

Use this command to set the amount of time required to transmit a link state update packet on an interface.

ip ospf transmit-delay *seconds*

Syntax Description

seconds	Specifies the transmit delay in seconds. Valid values are from **1** to **65535**.

Command Syntax of the "no" Form

The "no" form of this command resets the retransmit interval value to the default, 1 second:

no ip ospf transmit-delay

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the time required to transmit a link state update packet on VLAN 1 at 20 seconds:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip ospf transmit-delay 20
```

12.2.3.9 ip ospf hello-interval

Use this command to set the number of seconds a router must wait before sending a hello packet to neighbor routers on an interface. Each Matrix Series routing module or standalone device can support communications between up to 60 neighboring routers.

ip ospf hello-interval *seconds*

Syntax Description

seconds	Specifies the hello interval in seconds. Hello interval must be the same on neighboring routers (on a specific subnet), but can vary between subnets. This parameter is an unsigned integer with valid values between **1** and **65535**.

Command Syntax of the "no" Form

The "no" form of this command sets the hello interval value to the default (10 seconds for broadcast and point-to-point networks, 30 seconds for non-broadcast and point-to-multipoint networks):

no ip ospf hello-interval

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the hello interval to 5 for VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip ospf hello-interval 5
```

12.2.3.10 ip ospf dead-interval

Use this command to set the number of seconds a router must wait to receive a hello packet from its neighbor before determining that the neighbor is out of service.

ip ospf dead-interval *seconds*

Syntax Description

seconds	Specifies the number of seconds that a router must wait to receive a hello packet. Dead interval must be the same on neighboring routers (on a specific subnet), but can vary between subnets. This parameter is an unsigned integer ranging from **1** to **65535**.

Command Syntax of the "no" Form

The "no" form of this command sets the dead interval value to the default, 40 seconds:

no ip ospf dead-interval

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the dead interval to 20 for VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip ospf dead-interval 20
```

12.2.3.11 ip ospf authentication-key

Use this command to assign a password to be used by neighboring routers using OSPF's simple password authentication. This password is used as a "key" that is inserted directly into the OSPF header in routing protocol packets. A separate password can be assigned to each OSPF network on a per-interface basis.

ip ospf **authentication-key** *password*

NOTES: The password key set with this command will only be used when authentication is enabled for an OSPF area using the **area authentication** command described in Section 12.2.3.15.

All neighboring routers on the same network must have the same password configured to be able to exchange OSPF information.

Syntax Description

password	Specifies an OSPF authentication password. Valid values are alphanumeric strings up to 8 bytes in length.

Command Syntax of the "no" Form

The "no" form of this command removes an OSPF authentication password on an interface:

no ip ospf authentication-key

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

If *password* is not specified, the password will be set to a blank string.

Example

This example shows how to enables an OSPF authentication key on VLAN 1 with the password "yourpass":

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip ospf authentication-key yourpass
```

12.2.3.12 ip ospf message digest key md5

Use this command to enable or disable OSPF MD5 authentication on an interface. This validates OSPF MD5 routing updates between neighboring routers.

ip ospf message-digest-key *keyid* **md5** *key*

Syntax Description

keyid	Specifies the key identifier on the interface where MD5 authentication is enabled. Valid values are integers from **1** to **255**.
key	Specifies a password for MD5 authentication to be used with the *keyid*. Valid values are alphanumeric strings of up to 16 bytes.

Command Syntax of the "no" Form

The "no" form of this command disables MD5 authentication on an interface:

no ip ospf message-digest-key *keyid*

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable OSPF MD5 authentication on VLAN 1, set the key identifier to 20, and set the password to "passone":

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip ospf message-digest-key 20 md5 passone
```

12.2.3.13 distance ospf

Use this command to configure the administrative distance for OSPF routes. If several routes (coming from different protocols) are presented to the Matrix Series Route Table Manager (RTM), the protocol with the lowest administrative distance will be chosen for route installation. By default, OSPF administrative distance is set to 110. The **distance ospf** command can be used to change this value, resetting OSPF's route preference in relation to other routes as shown in the table below.

Route Source	Default Distance
Connected	0
Static	1
OSPF	110
RIP	120

distance ospf {**external** | **inter-area** | **intra-area**}*weight*

Syntax Description

external | **inter-area** | **intra-area**	Applies the distance value to external (type 5 and type 7), to inter-area, or to intra-area routes. **NOTE:** The value for intra-area distance must be less than the value for inter-area distance, which must be less than the value for external distance.
weight	Specifies an administrative distance for OSPF routes. Valid values are **1** - **255**.

Command Syntax of the "no" Form

The "no" form of this command resets OSPF administrative distance to the default value of 110:

no distance ospf {**external** | **inter-area** | **intra-area**}

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

If route type is not specified, the distance value will be applied to all OSPF routes.

Example

This example shows how to change the default administrative distance for external OSPF routes to 100:

```
Matrix>Router1(config)#router ospf 1
Matrix>Router1(config-router)#distance ospf external 100
```

12.2.3.14 area range

Use this command to define the range of addresses to be used by Area Border Routers (ABRs) when they communicate routes to other areas. Each Matrix Series module or standalone device can support up to 6 OSPF areas and up to 256 OSPF interfaces running per Matrix chassis.

area *area-id* **range** *ip-address ip-mask*

Syntax Description

area-id	Specifies the area at the boundary of which routes are to be summarized.
ip-address	Specifies the common prefix of the summarized networks.
ip-mask	Specifies the length of the common prefix.

Command Syntax of the "no" Form

The "no" form of this command stops the routes from being summarized:

no area *area-id* **range** *ip-address ip-mask*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to define the address range as 172.16.0.0/16 for summarized routes communicated at the boundary of area 0.0.0.0:

```
Matrix>Router1(config)#router ospf 1
Matrix>Router1(config-router)#area 0.0.0.0 range 172.16.0.0 255.255.0.0
```

12.2.3.15 area authentication

Use this command to enable or disable authentication for an OSPF area.

area *area-id* **authentication** {**simple** | **message-digest**}

Syntax Description

area-id	Specifies the OSPF area in which to enable authentication. Valid values are decimal values or IP addresses.
simple	Enables simple text authentication. Simple password authentication allows a password (key) to be configured per area. Routers in the same area that want to participate in the routing domain will have to be configured with the same key.
message-digest	Enables MD5 authentication on the OSPF area indicated by the *area-id*.

Command Syntax of the "no" Form

The "no" form of this command disables authentication for an OSPF area:

no area *area-id* **authentication** {**simple** | **message-digest**}

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to enable MD5 authentication on OSPF area 10.0.0.0:

```
Matrix>Router1(config)#router ospf 1
Matrix>Router1(config-router)#area 10.0.0.0 authentication message-digest
```

12.2.3.16 area stub

Use this command to define an OSPF area as a stub area. This is an area that carries no external routes.

area *area-id* **stub** [**no-summary**]

Syntax Description

area-id	Specifies the stub area. Valid values are decimal values or ip addresses.
no-summary	(Optional) Prevents an Area Border Router (ABR) from sending Link State Advertisements (LSAs) into the stub area. When this parameter is used, it means that all destinations outside of the stub area are represented by means of a default route.

Command Syntax of the "no" Form

The "no" form of this command changes the stub back to a plain area:

no area *area-id* **stub [**no-summary]

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

If **no-summary** is not specified, the stub area will be able to receive LSAs.

Example

The following example shows how to define OSPF area 10 as a stub area:

```
Matrix>Router1(config)#router ospf 1
Matrix>Router1(config-router)#area 10 stub
```

12.2.3.17 area default cost

Use this command to set the cost value for the default route that is sent into a stub area by an Area Border Router (ABR). The use of this command is restricted to ABRs attached to stub areas.

area *area-id* **default-cost** *cost*

Syntax Description

area-id	Specifies the stub area. Valid values are decimal values or IP addresses.
cost	Specifies a cost value for the summary route that is sent into a stub area by default. Valid values are 24-bit numbers, from **0** to **16777215**.

Command Syntax of the "no" Form

The "no" form of this command removes the cost value from the summary route that is sent into the stub area:

no area *area-id* **default-cost**

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to set the cost value for stub area 10 to 99:

```
Matrix>Router1(config)#router ospf 1
Matrix>Router1(config-router)#area 10 default-cost 99
```

12.2.3.18 area nssa

Use this command to configure an area as a not so stubby area (NSSA). An NSSA allows some external routes represented by external Link State Advertisements (LSAs) to be imported into it. This is in contrast to a stub area that does not allow any external routes. External routes that are not imported into an NSSA can be represented by means of a default route. This configuration is used when an OSPF internetwork is connected to multiple non-OSPF routing domains.

area *area-id* **nssa** [**default-information-originate**]

Syntax Description

area-id	Specifies the NSSA area. Valid values are decimal values or IP addresses.
default-information-originate	(Optional) Generates a default of Type 7 into the NSSA. This is used when the router is an NSSA ABR.

Command Syntax of the "no" Form

The "no" form of this command changes the NSSA back to a plain area:

no area *area-id* **nssa [default-information-originate**]

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

If **default-information-originate** is not specified, no default type will be generated.

Example

This example shows how to configure area 10 as an NSSA area:

```
Matrix>Router1(config)#router ospf 1
Matrix>Router1(config-router)#area 10 nssa default-information-originate
```

12.2.3.19 area virtual-link

Use this command to define an OSPF virtual link, which represents a logical connection between the backbone and a non-backbone OSPF area.

area *area-id* **virtual-link** *ip-address*

The options for using this syntax are:

- **area** *area-id* **virtual-link** *ip-address* **authentication-key** *key*
- **area** *area-id* **virtual-link** *ip-address* **dead-interval** *seconds*
- **area** *area-id* **virtual-link** *ip-address* **hello-interval** *seconds*
- **area** *area-id* **virtual-link** *ip-address* **retransmit-interval** *seconds*
- **area** *area-id* **virtual-link** *ip-address* **transmit-delay** *seconds*

Syntax Description

area-id	Specifies the transit area for the virtual link. Valid values are decimal values or IP addresses. A transit area is an area through which a virtual link is established.
ip-address	Specifies the IP address of the ABR. A virtual link is established from the ABR, where virtual link configuration is taking place.
authentication-key *key*	Specifies a password to be used by neighbor routers. Valid values are alphanumeric strings of up to 8 bytes. Neighbor routers on a network must have the same password.
dead-interval *seconds*	Specifies the number of seconds that the hello packets of a router are not communicated to neighbor routers before the neighbor routers determine that the router sending the hello packet is out of service. This value must be the same for all nodes attached to a certain subnet, and it is a value ranging from **1** to **8192**.
hello-interval *seconds*	Specifies the number of seconds between hello packets on an interface. This value must be the same for all nodes attached to a network and it is a value ranging from **1** to **8192**.

retransmit-interval *seconds*	Specifies the number of seconds between successive retransmissions of the same LSAs. Valid values are greater than the expected amount of time required for the update packet to reach and return from the interface, and range from **1** to **8192**.
transmit-delay *seconds*	Specifies the estimated number of seconds for a link state update packet on the interface to be transmitted. Valid values range from **1** to **8192**.

Command Syntax of the "no" Form

The "no" form of this command removes the virtual link:

no area *area-id* **virtual-link** *ip-address* **authentication-key** *key*

no area *area-id* **virtual-link** *ip-address* **dead-interval** *seconds*

no area *area-id* **virtual-link** *ip-address* **hello-interval** *seconds*

no area *area-id* **virtual-link** *ip-address* **retransmit-interval** *seconds*

no area *area-id* **virtual-link** *ip-address* **transmit-delay** *seconds*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to configure a virtual link between OSPF area 0.0.0.2 and ABR network 134.141.7.2:

```
Matrix>Router1(config)#router ospf 1
Matrix>Router1(config-router)#area 0.0.0.2 virtual-link 134.141.7.2
```

12.2.3.20 passive-interface

Use this command to enable passive OSPF on an interface. This allows an interface to be included in the OSPF route table, but turns off sending and receiving hellos for an interface. It also prevents OSPF adjacencies from being formed on an interface.

passive-interface vlan *vlan-id*

Syntax Description

vlan *vlan-id*	Specifies the interface on which to enable passive OSPF mode.

Command Syntax of the "no" Form

The "no" form of this command disables passive OSPF mode:

no passive-ospf vlan *vlan-id*

Command Type

Router command.

Command Mode

Router configuration: **Matrix->Router(config-router)#**

Command Defaults

None.

Example

This example shows how to enable passive OSPF mode on VLAN 102:

```
Matrix->Router1(config)#router ospf 1
Matrix->Router1(config-router)#passive-interface vlan 102
```

12.2.3.21 redistribute

Use this command to allow routing information discovered through non-OSPF protocols to be distributed in OSPF update messages.

redistribute {**rip** | **static** [**metric** *metric value*] [**metric-type** *type-value*] [**subnets**] [**tag**] | {**connected** [**route-map** *id-namber*] [**metric** *metric value*] [**metric-type** *type-value*] [**subnets**] [**tag** *tag*]}

Syntax Description

rip	Specifies that RIP routing information will be redistributed in OSPF.
static	Specifies that non-OSPF information discovered via static routes will be redistributed. Static routes are those created using the **ip route** command detailed in Section 11.2.6.5.
metric *metric value*	(Optional) Specifies a metric for the connected, RIP or static redistribution route. This value should be consistent with the designation protocol.
metric-type *type value*	(Optional) Specifies the external link type associated with the default connected, RIP or static route advertised into the OSPF routing domain. Valid values are **1** for type 1 external route, and **2** for type 2 external route.
subnets	(Optional) Specifies that connected, RIP or static routes that are subnetted routes will be redistributed.
tag *tag*	(Optional) Specifies that tagged routes will be redistributed in OSPF.
connected	Specifies that non-OSPF information discovered via directly connected interfaces will be redistributed. These are routes not specified in the OSPF network command as described in Section 12.2.3.2.
route-map *id-number*	(Optional) Redistributes according to a route map associated with a connected interface or IP address. Valid values are **1 - 99** and must match a configured ACL number as described in Section 13.3.12.2.

Command Syntax of the "no" Form

The "no" form of this command clears redistribution parameters:

no redistribute {**connected** | **rip** | **static**}

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

- If *metric value* is not specified, 0 will be applied.
- If *type value* is not specified, type 2 (external route) will be applied.
- If **subnets** is not specified, only non-subnetted routes will be redistributed.
- If **route-map** is not specified, none will be applied.
- If **tag** is not specified, none will be applied.

Example

This example shows how to distribute external type 2 RIP routing information from non-subnetted routes in OSPF updates:

```
Matrix>Router1(config)#router ospf
Matrix>Router1(config-router)#redistribute rip
```

12.2.3.22 database-overflow

Use this command to limit the size of OSPF link state database overflow, a condition where the router is unable to maintain the database in its entirety. Setting database overflow allows you to set a limit on the number of external LSAs. If the limit is exceeded, self-originated external LSAs will be removed so that OSPF can handle the large number of external LSAs coming from another router. When the warning level is set, a Syslog message will be issued when the number of external LSAs has reached the specified level. Every **exit-overflow interval** seconds, the database will be checked and, if the total is less than the limit specified, the self originated external LSAs will be restored.

database-overflow external {[**exit-overflow-interval** *interval*] [**limit** *limit*] [**warning-level** *level*]}

Syntax Description

external	Specifies the LSA type as external (Type 5.)
exit-overflow-interval *interval*	Specifies an interval (in seconds) the OSPF link state database will be checked to determine if the overflow limit has been reached. Valid values are **0** - **86400**. Default is **0**.
limit *limit*	Specifies the peak number of LSAs accepted before overflow occurs. Valid values are **0** - **4000**. Default is **0**. **NOTE:** Limit value must be greater than the warning-level value and set prior to it since all defaults are 0.
warning-level *level*	Specifies the number of LSAs at which a warning of pending overflow will be generated. Valid values are **0** - **4000**. Default is **0**.

Command Syntax of the “no” Form

The “no” form of this command removes the database overflow limits:

no database-overflow external {[**exit-overflow-interval** *interval*] [**limit** *limit*] [**warning-level** *level*]}

Command Type

Router command.

Command Mode

Router configuration: **Matrix->Router(config-router)#**

Command Defaults

None.

Example

This example shows how to set the OSPF database exit overflow interval to 240 seconds, the overflow limit to 3800 LSAs, and the warning level to 2500 LSAs:

```
Matrix->Router1(config)#router ospf 1
Matrix->Router1(config-router)#database-overflow external
exit-overflow-interval 240
Matrix->Router1(config-router)#database-overflow external limit 3800
Matrix->Router1(config-router)#database-overflow external warning-level 2500
```

12.2.3.23 show ip ospf

Use this command to display OSPF information.

show ip ospf

Syntax Description

None.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

None.

Example

This example shows how to display OSPF information:

```
Matrix>Router1#show ip ospf
Routing Process "ospf 20 " with ID 134.141.7.2
Supports only single TOS(TOS0) route
It is an area border and autonomous system boundary router
Summary Link update interval is 0 seconds.
External Link update interval is 0 seconds.
Redistributing External Routes from,
Number of areas in this router is 3
Area BACKBONE (0)
    Number of interfaces in this area is 0
    Area has no authentication
    SPF algorithm executed 65 times
    Area ranges are

    Link State Update Interval is 00:30:00 and due in 00:03:12.
    Link State Age Interval is 00:00:00 and due in 00:00:00.

Area 0.0.0.3
    Number of interfaces in this area is 1
    Area has no authentication
    SPF algorithm executed 59 times
    Area ranges are

    Link State Update Interval is 00:30:00 and due in 00:02:28.
    Link State Age Interval is 00:00:00 and due in 00:00:00.

Area 0.0.0.2
    Number of interfaces in this area is 3
    Area has no authentication
    SPF algorithm executed 61 times
    Area ranges are
         140.20.0.0/255.255.0.0

    Link State Update Interval is 00:30:00 and due in 00:03:07.
    Link State Age Interval is 00:00:00 and due in 00:00:00.
```

12.2.3.24 show ip ospf database

Use this command to display the OSPF link state database.

show ip ospf database [*link-state-id*]

The options for using this syntax are:

- **show ip ospf database router** [*link-state-id*]
- **show ip ospf database network** [*link-state-id*]
- **show ip ospf database summary** [*link-state-id*]
- **show ip ospf database asbr-summary** [*link-state-id*]
- **show ip ospf database external** [*link-state-id*]
- **show ip ospf database nssa-external** [*link-state-id*]
- **show ip ospf database database-summary**

Syntax Description

link-state-id	(Optional) Specifies the link state identifier. Valid values are IP addresses.
router	Displays router (Type 1) link state records in their detailed format. Router records are originated by all routers.
network	Displays network (Type 2) link state records in their detailed format. Network records are originated by designated routers.
summary	Displays summary (Type 3) link state records in their original format. Summary records are originated by ABRs.
asbr-summary	Displays Autonomous System Border Router (ASBR) summary (Type 4) link status records in their detail format. ASBR-summary records are originated by ABRs.
external	Displays external (Type 5) link state records. Type 5 link state records in their detailed format.
nssa-external	Displays nssa-external (Type 7) link state records in their detailed format. Type 7 records are originated by ASBRs.

database-summary	Displays a numerical summary of the contents of the link state database.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If *link-state-id* is not specified, the specified type of database records will be displayed for all link state IDs.

Example

This example shows how to display all OSPF link state database information:

```
Matrix>Router1#show ip ospf database
OSPF Router with ID(182.127.64.1)

         Displaying Net Link States(Area 0.0.0.0)
 LinkID         ADV Router      Age       Seq#       Checksum
182.127.63.1    182.127.62.1    956  0x80000001     0xb6ca

         Displaying Router Link States(Area 0.0.0.0)
 LinkID         ADV Router      Age       Seq#       Checksum LinkCount
182.127.64.1    182.127.64.1    308  0x8000000f     0x636b     2
182.127.62.1    182.127.62.1    952  0x8000001b     0x7ed7     1

         Displaying Summary Net Link States(Area 0.0.0.0)
 LinkID         ADV Router      Age       Seq#       Checksum
182.127.63.1    182.127.62.1    956  0x80000001     0xb6ca
```

Table 12-3 provides an explanation of the command output.

Table 12-3 show ip ospf database Output Details

Output	What It Displays...
Link ID	Link ID, which varies as a function of the link state record type, as follows: • Net Link States - Shows the interface IP address of the designated router to the broadcast network. • Router Link States - Shows the ID of the router originating the record. • Summary Link States - Shows the summary network prefix.
ADV Router	Router ID of the router originating the link state record.
Age	Age (in seconds) of the link state record.
Seq#	OSPF sequence number assigned to each link state record.
Checksum	Field in the link state record used to verify the contents upon receipt by another router.
LinkCount	Link count of router link state records. This number is equal to, or greater than, the number of active OSPF interfaces on the originating router.

12.2.3.25 show ip ospf border-routers

Use this command to display information about OSPF internal entries to Area Border Routers (ABRs) and Autonomous System Boundary Routers (ASBRs).

show ip ospf border-routers

Syntax Description

None.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

None.

Example

This example shows how to display information about OSPF border routers. The first line of this output shows that an intra-area route has been established to destination border router 192.168.22.1 via neighboring router 192.168.11.1 on the VLAN 2 interface in area 0. The OSPF cost of this route is 64, and it carries an SPF calculation of 10. The destination router is an ABR:

```
Matrix>Router1#show ip ospf border-routers
OSPF internal
Codes: i - Intra-area route, I - Inter-area route
i 192.168.22.1 [64] via 192.168.11.1, VLAN2, ABR, Area 0, SPF 10
i 192.168.22.1 [64] via 192.168.11.1, VLAN2, ABR, Area 4, SPF 10
i 192.168.44.1 [64] via 192.168.33.1, VLAN1, ABR, Area 0, SPF 10
i 192.168.44.1 [64] via 192.168.33.1, VLAN1, ABR, Area 2, SPF 7
i 192.168.44.2 [128] via 192.168.33.1, VLAN1, ABR, Area 0, SPF 10
i 192.168.44.2 [128] via 192.168.11.1, VLAN2, ABR, Area 0, SPF 10
```

12.2.3.26 show ip ospf interface

Use this command to display OSPF interface related information, including network type, priority, cost, hello interval, and dead interval.

show ip ospf interface [**vlan** *vlan-id*]

Syntax Description

vlan *vlan-id*	(Optional) Displays OSPF information for a specific VLAN. This VLAN must be configured for IP routing as described in Section 2.3.1.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If *vlan-id* is not specified, OSPF statistics will be displayed for all VLANs.

Example

This example shows how to display all OSPF related information for VLAN 1:

```
Matrix>Router1#show ip ospf interface vlan 1
Vlan  1 is UP
 Internet Address  182.127.63.2  Mask  255.255.255.0,Area 0.0.0.0
 Router ID 182.127.64.1,Network Type BROADCAST,Cost: 10
 Transmit Delay is 1 sec,State BACKUPDR,Priority 1
 Designated Router id 182.127.62.1, Interface addr 182.127.63.1
 Backup Designated Router id 182.127.63.2,
 Timer intervals configured, Hello 10,Dead 40,Wait 40,Retransmit 5
    Neighbor Count is 1, Adjacent neighbor count is 1
  Adjacent with neighbor 182.127.63.1 (Designated Router)
```

Table 12-4 provides an explanation of the command output.

Table 12-4 show ip ospf interface Output Details

Output	What It Displays...
Vlan	Interface (VLAN) administrative status as up or down.
Internet Address	IP address and mask assigned to this interface.
Router ID	Router ID, which OSPF selects from IP addresses configured on this router.
Network Type	OSPF network type, for instance, broadcast.
Cost	OSPF interface cost, which is either default, or assigned with the **ip ospf cost** command. For details, refer to Section 12.2.3.4.
Transmit Delay	The number (in seconds) added to the LSA (Link State Advertisement) age field.
State	The interface state (versus the state between neighbors). Valid values include BACKUPDR (Backup Designated Router), and DR (Designated Router).
Priority	The interface priority value, which is either default, or assigned with the **ip ospf priority** command. For details, refer to Section 12.2.3.5.
Designated Router id	The router ID of the designated router on this subnet, if one exists.
Interface addr	IP address of the designated router on this interface.
Backup Designated Router id	IP address of the backup designated router on this interface, if one exists.
Timer intervals configured	OSPF timer intervals. These are either default, or configured with the **ip ospf retransmit-interval** (Section 12.2.3.7), the **ip ospf hello-interval** (Section 12.2.3.9), and the **ip ospf dead interval** (Section 12.2.3.10) commands. The wait timer represents the amount of time a router waits before initiating a designated router/backup designated router election. The wait timer changes when the dead interval changes. The retransmit timer represents the amount of time between successive transmissions of LSAs (Link State Advertisements) until acknowledgement is received.
Neighbor Count	Number of neighbors over this interface.

Table 12-4 show ip ospf interface Output Details (Continued)

Output	What It Displays...
Adjacent neighbor count	Number of adjacent (FULL state) neighbors over this interface.
Adjacent with neighbor	IP address of the adjacent neighbor.

12.2.3.27 show ip ospf neighbor

Use this command to display the state of communication between an OSPF router and its neighbor routers.

show ip ospf neighbor [**detail**] [*ip-address*] [**vlan** *vlan-id*]

Syntax Description

detail	(Optional) Displays detailed information about the neighbors, including the area in which they are neighbors, who the designated router/backup designated router is on the subnet, if applicable, and the decimal equivalent of the E-bit value from the hello packet options field.
ip-address	(Optional) Displays OSPF neighbors for a specific IP address.
vlan *vlan-id*	(Optional) Displays OSPF neighbors for a specific VLAN. This VLAN must be configured for IP routing as described in Section 2.3.1.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

- If **detail** is not specified, summary information will be displayed.
- If *ip-address* is not specified, OSPF neighbors will be displayed for all IP addresses configured for routing.
- If *vlan-id* is not specified, OSPF neighbors will be displayed for all VLANs configured for routing.

Example

This example shows how to use the **show ospf neighbor** command:

```
Matrix>Router1#show ip ospf neighbor
ID              Pri    State     Dead-Int  Address       Interface
182.127.62.1      1    FULL      40        182.127.63.1  vlan1
```

Table 12-5 provides an explanation of the command output.

Table 12-5 show ip ospf neighbor Output Details

Output	What It Displays...
ID	Neighbor's router ID of the OSPF neighbor.
Pri	Neighbor's priority over this interface.
State	Neighbor's OSPF communication state.
Dead-Int	Interval (in seconds) this router will wait without receiving a Hello packet from a neighbor before declaring the neighbor is down.
Address	Neighbor's IP address.
Interface	Neighbor's interface (VLAN).

12.2.3.28 show ip ospf virtual-links

Use this command to display information about the virtual links configured on a router. A virtual link represents a logical connection between the backbone and a non-backbone OSPF area.

show ip ospf virtual-links

Syntax Description

None.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

None.

Example

This example shows how to display OSPF virtual links information:

```
Matrix>Router1#show ip ospf virtual-links
Virtual Link to router 5.5.5.1, is UP
 Transit area 0.0.0.2,via interface Vlan 7, Cost of using 10
 Transmit Delay is 1 sec(s), State POINT-TO-POINT
 Timer intervals configured:
                Hello 10, Dead 40, Wait 40, Retransmit 5
 Adjacency State FULL
```

Table 12-6 provides an explanation of the command output.

Table 12-6 show ip ospf virtual links Output Details

Output	What It Displays...
Virtual Link	ID of the virtual link neighbor, and the virtual link status, which is up or down.
Transit area	ID of the transit area through which the virtual link is configured.
via interface	Router's interface into the transit area.
Cost of using	OSPF cost of routing through the virtual link.

Table 12-6 show ip ospf virtual links Output Details (Continued)

Output	What It Displays...
Transit Delay	Time (in seconds) added to the LSA (Link State Advertisement) age field when the LSA is transmitted through the virtual link.
State	Interface state assigned to a virtual link, which is point-to-point.
Timer intervals configured	Timer intervals configured for the virtual link, including Hello, Dead, Wait, and Retransmit intervals.
Adjacency State	State of adjacency between this router and the virtual link neighbor of this router.

12.2.3.29 clear ip ospf process

Use this command to reset the OSPF process. This will require adjacencies to be reestablished and routes to be reconverged.

clear ip ospf process *process-id*

Syntax Description

process-id	Specifies the process ID, an internally used identification number for each instance of the OSPF routing process run on a router. Valid values are **1** to **65535**.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Example

This example shows how to reset OSPF process 1:

```
Matrix>Router1#clear ip ospf process 1
```

12.2.3.30 debug ip ospf

Use this command to enable OSPF protocol debugging output.

debug ip ospf {*subsystem*}

Syntax Description

subsystem	Specifies the OSPF subsystem for which protocol debugging will be enabled. Valid entries and their associated outputs are: • **adj** - OSPF adjacency events • **flood** - OSPF flooding • **lsa-generation** - OSPF Link State Advertisement generation • **packet** - OSPF packets • **retransmission** - OSPF retransmission events

Command Syntax of the "no" Form

The "no" form of this command disables OSPF protocol debugging output.

no debug ip ospf {*subsystem*}

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router1#**

Command Defaults

None.

Example

This example shows how to enable OSPF protocol debugging output to display information about Link State Advertisement generation:

```
Matrix>Router1#debug ip ospf lsa-generation
```

12.2.3.31 rfc1583compatible

Use this command to enable the OSPF router for RFC 1385 compatibility.

rfc1583compatible

Syntax Description

None

Command Syntax of the "no" Form

The "no" form of this command removes OSPF RFC 1583 compatible:

no rfc1583compatible

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to configure RFC 1583 compatibility:

```
Matrix>Router1(config)#router ospf 1
Matrix>Router1(config-router)#rfc1583compatible
```

12.2.4 Configuring DVMRP

Purpose

To enable and configure the Distance Vector Multicast Routing Protocol (DVMRP) on an interface. DVMRP routes multicast traffic using a technique known as Reverse Path Forwarding. When a router receives a packet, it floods the packet out of all paths except the one that leads back to the packet's source. Doing so allows a data stream to reach all VLANs (possibly multiple times). If a router is attached to a set of VLANs that do not want to receive from a particular multicast group, the router can send a "prune" message back up the distribution tree to stop subsequent packets from traveling where there are no members. DVMRP will periodically reflood in order to reach any new hosts that want to receive from a particular group.

NOTE: IGMP must be enabled on all VLANs running DVMRP. To do this, use the **set igmp enable** command as described in Section 9.4.1.2. It is also recommended that IGMP querying be enabled on all VLANs running DVMRP. To do this, use the **set igmp query-enable** command as described in Section 9.4.2.2.

Commands

The commands used to enable and configure DVMRP are listed below and described in the associated section as shown:

- ip dvmrp (Section 12.2.4.1)
- ip dvmrp metric (Section 12.2.4.2)
- show ip dvmrp route (Section 12.2.4.3)

12.2.4.1 ip dvmrp

Use this command to enable or disable DVMRP on an interface.

ip dvmrp

NOTE: IGMP must be enabled on all VLANs running DVMRP. To do this, use the **set igmp enable** command as described in Section 9.4.1.2. It is also recommended that IGMP querying be enabled on all VLANs running DVMRP. To do this, use the **set igmp query-enable** command as described in Section 9.4.2.2.

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command disables DVMRP:

no ip dvmrp

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable DVMRP on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip dvmrp
```

12.2.4.2 ip dvmrp metric

Use this command to configure the metric associated with a set of destinations for DVMRP reports.

ip dvmrp metric *metric*

Syntax Description

metric	Specifies a metric associated with a set of destinations for DVMRP reports. Valid values are from **0** to **31**. Entering a **0** value will reset the metric back to the default value of 1.

NOTE: To reset the DVMRP metric back to the default value of 1, enter **ip dvmrp metric 0**.

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set a DVMRP of 16 on VLAN 1:

```
Matrix>Router1(config-if(Vlan 1))#ip dvmrp metric 16
```

12.2.4.3 show ip dvmrp route

Use this command to display DVMRP routing information.

show ip dvmrp route

Syntax Description

None.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

None.

Example

This example shows how to display DVMRP routing table entries. In this case, the routing table has 5 entries. The first entry shows that the source network 60.1.1.0/24 can be reached via next-hop router 40.1.1.3. This route has a metric of 2. It has been in the DVMRP routing table for 1 hour, 24

minutes and 2 seconds and will expire in 2 minutes and 3 seconds. It supports flag messages for verifying neighbors, pruning, generation ID and netmask in prunes and grafts (VPGN):

```
Matrix>Router1#show ip dvmrp route
flag characters used:
-------------
V Neighbor is verified.
P Neighbor supports pruning.
G Neighbor supports generation ID.
N Neighbor supports netmask in prunes and grafts.
S Neighbor supports SNMP.
M Neighbor supports mtrace.
----------------
DVMRP Routing Table - 5 entries
60.1.1.0/24 [2] uptime: 1:24:2, expires: 0:2:3
    via neighbor: 40.1.1.3 version: 3.255  flags: VPGN  gen id: 0x336ff052
50.50.50.0/24 [2] uptime: 1:24:18, expires: 0:1:25
    via neighbor: 30.1.1.1 version: 3.255  flags: VPGN  gen id: 0xaa4ee1fa
40.40.40.0/24 [2] uptime: 1:24:2, expires: 0:2:3
    via neighbor: 40.1.1.3 version: 3.255  flags: VPGN  gen id: 0x336ff052
40.1.1.0/24 [1] uptime: 1:24:8, expires: 0:0:0
    via: local
30.1.1.0/24 [1] uptime: 1:24:20, expires: 0:0:0
    via: local
```

12.2.5 Configuring IRDP

Purpose

To enable and configure the ICMP Router Discovery Protocol (IRDP) on an interface. This protocol enables a host to determine the address of a router it can use as a default gateway.

Commands

The commands used to enable and configure IRDP are listed below and described in the associated section as shown:

- ip irdp (Section 12.2.5.1)
- ip irdp maxadvertinterval (Section 12.2.5.2)
- ip irdp minadvertinterval (Section 12.2.5.3)
- ip irdp holdtime (Section 12.2.5.4)
- ip irdp preference (Section 12.2.5.5)
- ip irdp address (Section 12.2.5.6)
- no ip irdp multicast (Section 12.2.5.7)
- show ip irdp (Section 12.2.5.8)

12.2.5.1 ip irdp

Use this command to enable or disable IRDP on an interface.

ip irdp

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command disables IRDP on an interface:

no ip irdp

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable IRDP on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip irdp
```

12.2.5.2 ip irdp maxadvertinterval

Use this command to set the maximum interval in seconds between IRDP advertisements.

ip irdp maxadvertinterval *interval*

Syntax Description

interval	Specifies a maximum advertisement interval in seconds. Valid values are **4** to **1800**.

Command Syntax of the "no" Form

The "no" form of this command resets the maximum advertisement interval to the default value of **600** seconds:

no irdp maxadvertinterval

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the maximum IRDP advertisement interval to 1000 seconds on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip irdp maxadvertinterval 1000
```

12.2.5.3 ip irdp minadvertinterval

Use this command to set the minimum interval in seconds between IRDP advertisements.

ip irdp minadvertinterval *interval*

Syntax Description

interval	Specifies a minimum advertisement interval in seconds. Valid values are **3** to **1800**.

Command Syntax of the "no" Form

The "no" form of this command deletes the custom holdtime setting and resets the minimum advertisement interval to the default value of three-fourths of the **maxadvertinterval** value:

no irdp minadvertinterval

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the minimum IRDP advertisement interval to 500 seconds on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip irdp minadvertinterval 500
```

12.2.5.4 ip irdp holdtime

Use this command to set the length of time in seconds IRDP advertisements are held valid.

ip irdp holdtime *holdtime*

NOTE: Hold time is automatically set at three times the **maxadvertinterval** value when the maximum advertisement interval is set as described in Section 12.2.5.2 and the minimum advertisement interval is set as described in Section 12.2.5.3.

Syntax Description

holdtime	Specifies the hold time in seconds. Valid values are **0** to **9000**.

Command Syntax of the "no" Form

The "no" form of this command resets the hold time to the default value of three times the **maxadvertinterval** value:

no irdp holdtime

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the IRDP hold time to 4000 seconds on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip irdp holdtime 4000
```

12.2.5.5 ip irdp preference

Use this command to set the IRDP preference value for an interface. This value is used by IRDP to determine the interface's selection as a default gateway address.

ip irdp preference *preference*

Syntax Description

preference	Specifies the value to indicate the interface's use as a default router address. Valid values are **-2147483648** to **2147483647**. The value of **80000000** indicates that the address, even though it may be advertised, is not to be used by neighboring hosts as a default router address.

Command Syntax of the "no" Form

The "no" form of this command resets the interface's IRDP preference value to the default of **0**:

no irdp preference

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the IRDP preference value to 80000000 seconds on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip irdp preference 80000000
```

12.2.5.6 ip irdp address

Use this command to add additional IP addresses for IRDP to advertise.

ip irdp address *ip-address preference*

Syntax Description

ip-address	Specifies an IP address to advertise.
preference	Specifies the value to indicate the address' use as a default router address. Valid values are **-2147483648** to **2147483647**. The value of **80000000** indicates that the address, even though it may be advertised, is not to be used by neighboring hosts as a default router address.

Command Syntax of the "no" Form

The "no" form of this command clears an IP address from being advertised:

no ip irdp preference *ip-address*

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to advertise IP address 183.255.0.162 with a preference of 1 on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip irdp address 183.255.0.162 1
```

12.2.5.7 no ip irdp multicast

Use this command to enable the router to send IRDP advertisements using broadcast rather than multicast transmissions. By default, the router sends IRDP advertisements via multicast.

no ip irdp multicast

Syntax Description

None.

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to enable the router to send IRDP advertisements using broadcast:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#no ip irdp multicast
```

12.2.5.8 show ip irdp

Use this command to display IRDP information.

show ip irdp [**vlan** *vlan-id*]

Syntax Description

vlan *vlan-id*	(Optional) Displays IRDP information for a specific VLAN. This VLAN must be configured for IP routing as described in Section 2.3.1.

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

If **vlan** *vlan-id* is not specified, IRDP information for all interfaces will be displayed.

Example

This example shows how to display IRDP information for VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(vlan 1))#show ip irdp vlan 1
Interface 1 is not enabled
```

12.2.6 Configuring VRRP

Purpose

To enable and configure the Virtual Router Redundancy Protocol (VRRP). This protocol eliminates the single point of failure inherent in the static default routed environment by transferring the responsibility from one router to another if the original router goes down. VRRP-enabled routers decide who will become master and who will become backup in the event the master fails.

Commands

The commands used to enable and configure VRRP are listed below and described in the associated section as shown:

- router vrrp (Section 12.2.6.1)
- create (Section 12.2.6.2)
- address (Section 12.2.6.3)
- priority (Section 12.2.6.4)
- master-icmp-reply (Section 12.2.6.5)
- advertise-interval (Section 12.2.6.6)
- critical-ip (Section 12.2.6.7)
- preempt (Section 12.2.6.8)
- preempt-delay (Section 12.2.6.9)
- enable (Section 12.2.6.10)
- ip vrrp authentication-key (Section 12.2.6.11)
- ip vrrp message-digest-key (Section 12.2.6.12)
- show ip vrrp (Section 12.2.6.13)

12.2.6.1 router vrrp

Use this command to enable or disable VRRP configuration mode.

router vrrp

NOTE: You must execute the **router vrrp** command to enable the protocol before completing other VRRP-specific configuration tasks. For details on enabling configuration modes, refer to Table 2-12 in Section 2.3.3.

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command removes all VRRP configurations from the running configuration:

no router vrrp

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how enable VRRP configuration mode:

```
Matrix>Router1#configure terminal
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#
```

12.2.6.2 create

Use this command to create a VRRP session. Each Matrix Series Gold routing module supports up to 128 VRRP sessions. Up to four VRIDs can be associated with an individual routing interface.

create vlan *vlan-id vrid*

NOTE: This command must be executed to create an instance of VRRP on a routing interface (VLAN) before any other VRRP settings can be configured.

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN on which to create a VRRP session. This VLAN must be configured for IP routing as described in Section 2.3.1.
vrid	Specifies a unique Virtual Router ID (VRID) to associate with the routing interface. The value of *vrid* can range from 1 to 255.

Command Syntax of the "no" Form

The "no" form of this command disables the VRRP session:

no create vlan *vlan-id vrid*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to create a VRRP session on VLAN 1 with a VRID of 1:

```
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#create vlan 1 1
```

12.2.6.3 address

Use this command to configure a virtual router IP address. If the virtual router IP address is the same as the interface (VLAN) address owned by a VRRP router, then the router owning the address becomes the master. The master sends an advertisement to all other VRRP routers declaring its status and assumes responsibility for forwarding packets associated with its virtual router ID (VRID).

If the virtual router IP address is not owned by any of the VRRP routers, then the routers compare their priorities and the higher priority owner becomes the master. If priority values are the same, then the VRRP router with the higher IP address is selected master. For details on using the **priority** command, refer to Section 12.2.6.4.

Each VRRP routing interface can support up to 16 virtual router IP addresses. A virtual router IP address can be either an address configured on the routing interface or an address that falls within the range of any networks configured on the routing interface. All of the virtual router IP addresses associated with a single VRID must be designated as "owner" or "non-owner"— a mix of "owner" and "non-owner" addresses on a single VRID is not allowed.

address vlan *vlan-id vrid ip-address owner*

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN on which to configure a virtual router address. This VLAN must be configured for IP routing as described in Section 2.3.1.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface.
ip-address	Specifies the virtual router IP address to associate with the router. The limit is 16 virtual router IP addresses per interface.
owner	Specifies a value to indicate if the router owns the IP address as one of its interfaces. Valid values are: • **1** to indicate the router owns the address. • **0** to indicate the router does not own the address.

Command Syntax of the "no" Form

The "no" form of this command clears the VRRP address configuration:

no address vlan *vlan-id vrid ip-address owner*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Examples

This example shows how to configure a virtual router address of 182.127.62.1 on VLAN 1, VRID 1, and to set the router connected to the VLAN via this interface as the master:

```
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#address vlan 1 1 182.127.62.1 1
```

This example shows how to configure 5 virtual router addresses on a single interface, VLAN 1, VRID 1. All 5 addresses fall within the range of networks configured on the VLAN 1 routing interface, because VLAN 1 has a primary IP address of 182.127.62.1/24, and secondary IP addresses of 10.1.1.1/24 and 10.2.2.1/24. All virtual addresses are non-owners.

```
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#address vlan 1 1 182.127.62.2 0
Matrix>Router1(config-router)#address vlan 1 1 10.1.1.2 0
Matrix>Router1(config-router)#address vlan 1 1 10.1.1.3 0
Matrix>Router1(config-router)#address vlan 1 1 10.2.2.2 0
Matrix>Router1(config-router)#address vlan 1 1 10.2.2.3 0
```

12.2.6.4 priority

Use this command to set a priority value for a VRRP router.

priority vlan *vlan-id vrid priority-value*

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN on which to configure VRRP priority. This VLAN must be configured for IP routing as described in Section 2.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.
priority-value	Specifies the VRRP priority value to associate with the *vrid*. Valid values are from **1** to **254**, with the highest value setting the highest priority. Priority value of **255** is reserved for the VRRP router that owns the IP address associated with the virtual router. Priority **0** is reserved for signaling that the master has stopped working and the backup router must transition to master state.

Command Syntax of the "no" Form

The "no" form of this command clears the VRRP priority configuration:

no priority vlan *vlan-id vrid priority-value*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how set a VRRP priority of 200 on VLAN 1, VRID 1:

```
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#priority vlan 1 1 200
```

12.2.6.5 master-icmp-reply

Use this command to enable ICMP replies for non-owner masters. This provides the ability for the virtual router master to respond to an ICMP echo even if it does not "own" the virtual IP address. Without this function, the virtual router can only respond to an ICMP echo when the virtual IP address matches the real IP address of the interface. Therefore, when the backup router takes over, there would be no device that would answer the ICMP echo for that virtual IP (because only the primary was configured with the matching real IP). With master-icmp-reply enabled, management stations that use "ping" to poll devices will be able to "see" that the virtual router is available when the backup router assumes the role of master.

master-icmp-reply vlan *vlan-id vrid*

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN on which to enable master ICMP replies. This VLAN must be configured for IP routing as described in Section 2.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.

Command Syntax of the "no" Form

The "no" form of this command disables master ICMP replies:

no master-icmp-reply vlan *vlan-id vrid*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how enable master ICMP replies on VLAN 1, VRID 1:

```
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#master-icmp-reply vlan 1 1
```

12.2.6.6 advertise-interval

Use this command to set the interval in seconds between VRRP advertisements. These are sent by the master router to other routers participating in the VRRP master selection process, informing them of its configured values. Once the master is selected, then advertisements are sent every advertising interval to let other VRRP routers in this VLAN/VRID know the router is still acting as master of the VLAN/VRID.

advertise-interval vlan *vlan-id vrid interval*

NOTE: All routers with the same VRID should be configured with the same advertisement interval.

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN on which to configure the VRRP advertisement interval. This VLAN must be configured for IP routing as described in Section 2.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.
interval	Specifies a VRRP advertisement interval to associate with the *vrid*. Valid values are from **1** to **255** seconds.

Command Syntax of the "no" Form

The "no" form of this command clears the VRRP advertise interval value:

no advertise-interval vlan *vlan-id vrid interval*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how set an advertise interval of 3 seconds on VLAN 1, VRID 1:

```
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#advertise-interval vlan 1 1 3
```

12.2.6.7 critical-ip

Use this command to set a critical IP address for VRRP routing. A critical IP address defines an interface — in addition to the interface between hosts and a first-hop router — that will prevent the master router from functioning properly if the interface were to fail. For example, an IP address of an interface connecting a master router to a router configured for internet access would be considered a critical IP address for VRRP routing. Up to four critical IP addresses can be configured on the device.

critical-ip vlan *vlan-id vrid ip-address* [*critical-priority*]

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN on which to set the critical IP address. This VLAN must be configured for IP routing as described in Section 2.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.
ip-address	Specifies the IP address to set as the critical IP address.
critical-priority	(Optional) Specifies the value by which the VRID's priority will decrease as a critical IP becomes unavailable.

Command Syntax of the "no" Form

The "no" form of this command clears the critical IP address:

no critical-ip vlan *vlan-id vrid ip-address*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

If not specified, *critical-priority* will be set to 10.

Example

This example shows how to set IP address 182.127.62.3 as a critical IP address associated with VLAN 1, VRID 1:

```
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#critical-ip vlan 1 1 182.127.62.3
```

12.2.6.8 preempt

Use this command to enable or disable preempt mode on a VRRP router. Preempt is enabled on VRRP routers by default, which allows a higher priority backup router to preempt a lower priority master.

preempt *vlan-id vrid*

NOTE: The router that owns the virtual router IP address always preempts other routers, regardless of this setting.

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN on which to set preempt mode. This VLAN must be configured for IP routing as described in Section 2.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.

Command Syntax of the "no" Form

The "no" form of this command disables preempt mode:

no preempt *vlan-id vrid*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to disable preempt mode on VLAN 1, VRID 1:

```
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#no preempt vlan 1 1
```

12.2.6.9 preempt-delay

Use this command to set a preempt delay time on a VRRP router. When preempt mode is enabled this specifies a delay (in seconds) that a higher priority backup router must wait to preempt a lower priority master. For more information on setting preempt status, refer back to Section 12.2.6.8. For more information on setting VRRP priority, refer back to Section 12.2.6.4.

preempt-delay *vlan-id vrid delay-timer*

NOTE: The router that owns the virtual router IP address always preempts other routers, regardless of this setting.

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN on which to set a preempt delay value. This VLAN must be configured for IP routing as described in Section 2.3.2, and must have preempt mode enabled as described in Section 12.2.6.8.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.
delay-timer	Specifies a preempt delay time in seconds. Valid values are from **1** to **900**.

Command Syntax of the "no" Form

The "no" form of this command clears the preempt delay timer:

no preempt-delay *vlan-id vrid*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to set the preempt delay to 60 seconds on VLAN 1, VRID 1:

```
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#preempt-delay vlan 1 1 60
```

12.2.6.10 enable

Use this command to enable VRRP on an interface.

enable vlan *vlan-id vrid*

NOTE: Before enabling VRRP, you must set the other options described in this section. Once enabled, you cannot make any configuration changes to VRRP without first disabling it using the **no enable vlan** command.

Syntax Description

vlan *vlan-id*	Specifies the number of the VLAN on which to enable VRRP. This VLAN must be configured for IP routing as described in Section 2.3.2.
vrid	Specifies the Virtual Router ID (VRID) associated with the *vlan-id*. Valid values are from **1** to **255**.

Command Syntax of the "no" Form

The "no" form of this command disables VRRP on an interface:

no enable vlan *vlan-id vrid*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router1(config-router)#**

Command Defaults

None.

Example

This example shows how to enable VRRP on VLAN 1, VRID 1:

```
Matrix>Router1(config)#router vrrp
Matrix>Router1(config-router)#enable vlan 1 1
```

12.2.6.11 ip vrrp authentication-key

Use this command to set a VRRP authentication password on an interface.

ip vrrp authentication-key *password*

Syntax Description

password	Specifies an authentication password. Text string can be 1 to 8 characters in length.

Command Syntax of the "no" Form

The "no" form of this command clears VRRP authentication:

no ip vrrp authentication-key

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the VRRP authentication password to "vrrpkey" on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip vrrp authentication-key vrrpkey
```

12.2.6.12 ip vrrp message-digest-key

Use this command to set a VRRP MD5 authentication password on an interface.

ip vrrp message-digest-key *vrid* **md5** *password* [**hmac-96]**

Syntax Description

vrid	Specifies the Virtual Router ID (VRID). Valid values are from **1** to **255**.
md5	Specifies the authentication type as MD5.
password	Specifies an MD5 authentication password. Text string can be 1 to 16 characters in length.
hmac-96	(Optional) If VRRP is running between Matrix N or Matrix E1 routers, this keyword is not required. If VRRP is run between an Matrix N router and something other than an Matrix E1 or an Matrix N router, this keyword allows the md5 authentication to work between those routers.

Command Syntax of the "no" Form

The "no" form of this command clears VRRP MD5 authentication:

no ip vrrp message-digest-key

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the VRRP MD5 authentication password to "qwer" on VLAN 1, VRID 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip vrrp message-digest-key 1 md5 qwer
```

12.2.6.13 show ip vrrp

Use this command to display VRRP routing information.

show ip vrrp

Syntax Description

None.

Command Type

Router command.

Command Mode

Any router mode**.**

Command Defaults

None.

Example

This example shows how to display VRRP information:

```
Matrix>Router1(config)#show ip vrrp

-----------VRRP CONFIGURATION-----------
  Vlan    Vrid    State   Owner  AssocIpAddr  Priority  VirtMacAddr
  2         1     Init    0      25.25.2.1      100     0000.05e0.0011
```

13

Security Configuration

This chapter describes the Security Configuration set of commands and how to use them.

13.1 OVERVIEW OF SECURITY METHODS

The following security methods are available for controlling which users are allowed to access, monitor, and manage the device.

- Local user credentials — used for local authentication and authorization of CLI and WebView management sessions. For details, refer to Section 2.2.1 and Section 13.3.1.
- Remote AAA service — used for remote authentication, authorization, and accounting of CLI and WebView management sessions, as well as all network access sessions provisioned by way of 802.1x, PWA, or MAC Authentication. For details, refer to Section 13.3.1 and Section 13.3.5.
- Support for RADUIS, RFC 3580, and TACACS+ can be found in the following sections: Section 13.3.2, Section 13.3.3, and Section 13.3.4
- SNMP user or community names — used for authentication and authorization of all SNMP requests. For details, refer to Chapter 4.
- 802.1X Network Access Control — used for controlling access to network resources on a per port, per user, or per end station basis. For more details, refer to Section 13.3.5.
- Port Web Authentication (PWA) — used for controlling access to network resources on a per user basis via HTTP. For details, refer to Section 13.3.6.
- MAC Authentication — used for controlling access to network resources on a per MAC address basis. For details, refer to Section 13.3.7.
- Convergence End Point (CEP) — Convergence Endpoint (CEP) detection is an Enterasys Networks mechanism for identifying IP phones that are connected to a given switch. When an endpoint is discovered, a policy is then assigned to the endpoint. For details, refer to Section 13.3.8

- MAC Locking — locks a port to one or more MAC addresses, preventing connection of unauthorized devices via the port. For details, refer to Section 13.3.9.
- Multiple User Multiple Authentication – allows multiple users on a given port to simultaneously authenticate using any or all of the supported protocols (MAC Authentication, PWA, 802.1X), and for each authenticated user to receive a unique level of network access. For details, refer to Section 13.3.10.

NOTE: Matrix DFE Gold modules support one authenticated user and one IP phone per port. The system (chassis) supports up to 1024 authenticated users.

- Secure Shell (SSH) — provides for secure remote CLI management access. For details, refer to Section 13.3.11.
- IP Access Lists (ACLs) — permits or denies access to routing interfaces based on protocol and inbound and/or outbound IP address restrictions configured in access lists. For details, refer to Section 13.3.12.
- Policy-Based Routing — permits or denies access to routing interfaces based on access lists in a route map applied to the interface. For details, refer to Section 13.3.13.
- Denial of Service (DoS) Prevention — prevents Denial of Service attacks, including land, fragmented and large ICMP packets, spoofed address attacks, and UDP/TCP port scanning. For details, refer to Section 13.3.14.
- Flow Setup Throttling (FST) — prevents the effects of DoS attacks by limiting the number of new or established flows that can be programmed on any individual switch port. For details, refer to Section 13.3.15.

13.1.1 RADIUS Filter-ID Attribute and Dynamic Policy Profile Assignment

If you configure an authentication method that requires communication with a RADIUS server, you can use the RADIUS Filter-ID attribute to dynamically assign a policy profile and/or management level to authenticating users and/or devices.

The RADIUS Filter-ID attribute is simply a string that is formatted in the RADIUS Access-Accept packet sent back from the RADIUS server to the switch during the authentication process.

Each user can be configured in the RADIUS server database with a RADIUS Filter-ID attribute that specifies the name of the policy profile and/or management level the user should be assigned upon successful authentication. During the authentication process, when the RADIUS server returns a RADIUS Access-Accept message that includes a Filter-ID matching a policy profile name configured on the switch, the switch then dynamically applies the policy profile to the physical port the user/device is authenticating on.

Filter-ID Attribute Formats

Enterasys Networks supports two Filter-ID formats — "decorated" and "undecorated." The decorated format has three forms:

- To specify the policy profile to assign to the authenticating user (network access authentication):

  `Enterasys:version=1:policy=`*`string`*

  where *string* specifies the policy profile name. Policy profile names are case-sensitive.

- To specify a management level (management access authentication):

  `Enterasys:version=1:mgmt=`*`level`*

  where *level* indicates the management level, either **ro**, **rw**, or **su**.

- To specify both management level and policy profile:

  `Enterasys:version=1:mgmt=`*`level`*`:policy=`*`string`*

The undecorated format is simply a string that specifies a policy profile name. The undecorated format cannot be used for management access authentication.

Decorated Filter-IDs are processed first. If no decorated Filter-IDs are found, then undecorated Filter-IDs are processed. If multiple Filter-IDs are found that contain conflicting values, a Syslog message is generated.

13.2 PROCESS OVERVIEW: SECURITY CONFIGURATION

Use the following steps as a guide to configuring security methods on the device:

1. Setting the Authentication Login Method (Section 13.3.1)
2. Configuring RADIUS (Section 13.3.2)
3. Configuring RFC 3580 Support (Section 13.3.4)
4. Configuring TACACS+ (Section 13.3.4)
5. Configuring 802.1X Authentication (Section 13.3.5)
6. Configuring Port Web Authentication (PWA) (Section 13.3.6)
7. Configuring MAC Authentication (Section 13.3.7)
8. Configuring Convergence End Point (CEP) (Section 13.3.8)
9. Configuring MAC Locking (Section 13.3.9)
10. Configuring Multiple Authentication (Section 13.3.10)
11. Configuring Secure Shell (SSH) (Section 13.3.11)
12. Configuring Access Lists (Section 13.3.12)
13. Configuring Policy-Based Routing (Section 13.3.13)
14. Configuring Denial of Service (DoS) Prevention (Section 13.3.14)
15. Configuring Flow Setup Throttling (FST) (Section 13.3.15)

13.3 SECURITY CONFIGURATION COMMAND SET

13.3.1 Setting the Authentication Login Method

Purpose

To configure the authentication login method.

Commands

The commands used to configure the authentication login method are listed below and described in the associated section as shown:

- show authentication login (Section 13.3.1.1)
- set authentication login (Section 13.3.1.2)
- clear authentication login (Section 13.3.1.3)

13.3.1.1 show authentication login

Use this command to display the current authentication login method.

show authentication login

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

None.

Example

This example shows how to display the current authentication login method:

```
Matrix(rw)->show authentication login
Current authentication login is any
```

13.3.1.2 set authentication login

Use this command to set the authentication login method.

set authentication login {**any** | **local** | **radius** | **tacacs**}

Syntax Description

any	Specifies that the authentication protocol will be selected using the following precedence order: • TACACS+ • RADIUS • Local
local	Specifies that the local network password settings will be used for authentication login.
radius	Specifies that RADIUS will be used for authentication login.
tacacs	Specifies that TACACS + will be used for authentication login

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to set the authentication login method to use the local password settings:

```
Matrix(rw)->set authentication login local
```

13.3.1.3 clear authentication login

Use this command to reset the authentication login method to the default setting of "any".

clear authentication login

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to reset the authentication login method:

```
Matrix(rw)->clear authentication login
```

13.3.2 Configuring RADIUS

Purpose

To perform the following:

- Review the RADIUS client/server configuration on the device.
- Enable or disable the RADIUS client.
- Set local and remote login options.
- Set primary and secondary server parameters, including IP address, timeout period, authentication realm, and number of user login attempts allowed.
- Reset RADIUS server settings to default values.
- Configure a RADIUS accounting server.

Commands

The commands used to review and configure RADIUS are listed below and described in the associated section as shown:

- show radius (Section 13.3.2.1)
- set radius (Section 13.3.2.2)
- clear radius (Section 13.3.2.3)
- show radius accounting (Section 13.3.2.4)
- set radius accounting (Section 13.3.2.5)
- clear radius accounting (Section 13.3.2.6)

13.3.2.1 show radius

Use this command to display the current RADIUS client/server configuration.

show radius [**state** | **retries authtype** || **timeout** | **server** [*index* | **all**]]

Syntax Description

state	(Optional) Displays the RADIUS client's enable status.
retries	(Optional) Displays the number of retry attempts before the RADIUS server times out.
authtype	(Optional) Displays the RADIUS server's authentication type.
server	(Optional) Displays RADIUS server configuration information.
timeout	(Optional) Displays the maximum amount of time (in seconds) to establish contact with the RADIUS server before retry attempts begin.
index | **all**	(Optional) Displays configuration information for a specified server or all RADIUS servers.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no parameters are specified, all RADIUS configuration information will be displayed.

Example

This example shows how to display RADIUS configuration information:

```
Matrix(rw)->show radius
RADIUS state:       Enabled
RADIUS retries:     2
RADIUS timeout:     3 seconds
RADIUS Server    IP Address       Auth-Port  Realm-Type          Status
  ---------- --------------- ---------  ------------------       -------
1                100.10.0.100     1812       any                 Active
```

Table 13-1 provides an explanation of the command output.

Table 13-1 show radius Output Details

Output	What It Displays...
RADIUS state	Whether the RADIUS client is **enabled** or **disabled**.
RADIUS retries	Number of retry attempts before the RADIUS server times out. The default value of **3** can be reset using the **set radius** command as described in Section 13.3.2.2.
RADIUS timeout	Maximum amount of time (in seconds) to establish contact with the RADIUS server before retry attempts begin. The default value of **20** can be reset using the **set radius** command as described in Section 13.3.2.2.
RADIUS Server	IP address, UDP authentication port, authentication realm type (**management**, **network** or **any**), and status (whether or not the RADIUS server has been configured).

13.3.2.2 set radius

Use this command to enable, disable, or configure RADIUS authentication.

set radius {[**enable** | **disable**] [**retries** *number-of-retries*] [**timeout** *timeout*] [**server** {*index ip-address port* [*secret-value*]} [**realm** {**management-access** | **network-access** | **any**} {*index* | **all**}]}

NOTE: The RADIUS client can only be enabled on the switch once a RADIUS server is online, and its IP address(es) has been configured with the same password the RADIUS client will use.

Syntax Description

enable | **disable**	Enables or disables the RADIUS client.
retries *number-of-retries*	Specifies the number of retry attempts before the RADIUS server times out. Valid values are from **1** to **10**. Default is **3**.
timeout *timeout*	Specifies the maximum amount of time (in seconds) to establish contact with the RADIUS server before retry attempts begin. Valid values are from **1** to **30**. Default is **20** seconds.
server *index ip_address port*	Specifies the index number, IP address and the UDP authentication port for the RADIUS server.
secret-value	(Optional) Specifies an encryption key to be used for authentication between the RADIUS client and server.
realm management -access | **network-access** | **any**	(Optional) Restricts the RADIUS server realm to management or network access authentication, or allows it to perform all authentications.
index | **all**	Applies the server realm setting to a specific server or to all servers.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

- If *secret-value* is not specified, none will be applied.
- If **realm** is not specified, **any** authentication will be allowed.

Examples

This example shows how to enable the RADIUS client for authenticating with RADIUS server 1 at IP address 10.1.6.203, UDP authentication port 1812, and an authentication password of "pwsecret." As previously noted, the "server secret" password entered here must match that already configured as the Read-Write (rw) password on the RADIUS server:

```
Matrix(rw)->set radius server 1 10.1.6.203 1812 pwsecret
```

This example shows how to restrict all RADIUS servers to authenticate management access only

```
Matrix(rw)->set radius realm management-access all
```

This example shows how to set the RADIUS timeout to 5 seconds:

```
Matrix(rw)->set radius timeout 5
```

This example shows how to set RADIUS retries to 10:

```
Matrix(rw)->set radius retries 10
```

13.3.2.3 clear radius

Use this command to clear RADIUS server settings.

clear radius [**state**] [**retries**] [**timeout**] [**server** [*index* | **all**] [**realm** {*index* | **all**}]

Syntax Description

state	(Optional) Resets the RADIUS client state to the default setting of disabled.
retries	(Optional) Resets the maximum number of attempts a user can contact the RADIUS server before timing out to **3**.
timeout	(Optional) Resets the maximum amount of time to establish contact with the RADIUS server before timing out to **20** seconds.
server	(Optional) Deletes server settings.
realm	(Optional) Resets the realm setting to allowing any authentication.
index | **all**	Resets settings for a specified server or all RADIUS servers.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

- If *index* or **all** is not specified for clearing RADIUS server, all RADIUS server settings will be deleted.
- If no other optional parameters are specified, all RADIUS settings will be cleared.

Examples

This example shows how to clear all settings on all RADIUS servers:

```
Matrix(rw)->clear radius server all
```

This example shows how to reset the RADIUS timeout to the default value of 20 seconds:

```
Matrix(rw)->clear radius timeout
```

13.3.2.4 show radius accounting

Use this command to display the RADIUS accounting configuration. This transmits accounting information between a network access server and a shared accounting server.

show radius accounting [**updateinterval**] | [**intervalminimum**] | [**state**] | [**server** {*index* | **all**}]

Syntax Description

updateinterval	(Optional) Displays the number of seconds between each RADIUS accounting interim update (when accumulated accounting data is sent to the server for a session.)
intervalminimum	(Optional) Displays the minimum update interval setting. This controls the frequency of RADIUS accounting updates.
state	(Optional) Displays the RADIUS accounting enable state.
server *index* | **all**	(Optional) Displays one or all RADIUS accounting server configurations.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no parameters are specified, all RADIUS accounting configuration information will be displayed.

Example

This example shows how to display RADIUS accounting configuration information. In this case, RADIUS accounting is enabled and global default settings have not been changed. One server has been configured. The Matrix Series device allows for up to 10 RADIUS accounting servers to be configured, with up to 2 active at any given time.

For details on enabling and configuring RADIUS accounting, refer to Section 13.3.2.5:

```
Matrix(rw)->show radius accounting
Accounting state:               Enabled
Accounting update interval:     1800 secs
Accounting interval minimum:    600 secs

Server        Server          Acct
Index           IP            Port  Retries  Timeout     Status
-------------------------------------------------------------------
1           1.1.1.1           1236     2        5        Primary
```

13.3.2.5 set radius accounting

Use this command to configure RADIUS accounting.

set radius accounting {[**enable**] [**disable**] [**intervalminimum** *value*] [**updateinterval** *value*] [**retries** *retries*] [**timeout** *timeout*] [**server** {*index* | **all**} *ip_address port* [*server-secret*]

Syntax Description

enable | **disable**	Enables or disables the RADIUS accounting client.
intervalminimum *value*	Sets the minimum interval at which RADIUS accounting will send interim updates. Valid values are **60** - **2147483647**.
updateinterval *value*	Sets the number of seconds between each RADIUS accounting interim update (when accumulated accounting data is sent to the server for a session.) Valid values are **180** - **2147483647**.
retries *retries*	Sets the maximum number of attempts to contact a specified RADIUS accounting server before timing out. Valid retry values are **1** - **2147483647**.
timeout *timeout*	Sets the maximum amount of time (in seconds) to establish contact with a specified RADIUS accounting server before timing out. Valid timeout values are **1** - **2147483647**.
index | **all**	Applies the settings to a specific RADIUS accounting server or to all.
server *ip_address* port server-secret	Specifies the accounting server's: • IP address • UDP authentication port (**0** - **65535)** • *server-secret* (Read-Write password to access this accounting server. Device will prompt for this entry upon creating a server instance, as shown in the example below.)

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to enable the RADIUS accounting client for authenticating with the accounting server 1 at IP address 10.2.4.12, UDP authentication port 1800. As previously noted, the "server secret" password entered here must match that already configured as the Read-Write (rw) password on the RADIUS accounting server:

```
Matrix(rw)->set radius accounting server 1 10.2.4.12 1800
 Server Secret:******
 Retype Server Secret:******
 Make This Entry Active (y/n)? y
 Warning: rfc2138 recommends secret minimum length of 16
```

This example shows how to set the RADIUS accounting timeout to 30 seconds on server 6:

```
Matrix(rw)->set radius accounting timeout 30 6
```

This example shows how to set RADIUS accounting retries to 10 on server 6:

```
Matrix(rw)->set radius accounting retries 10 6
```

13.3.2.6 clear radius accounting

Use this command to clear RADIUS accounting configuration settings.

clear radius accounting {[**server**{*index* | **all**}] [**retries** {*index* | **all**}] [**timeout** {*index* | **all**}] [**intervalminimum**] [**updateinterval**]}

Syntax Description

server *index* | **all**	Clears the configuration on one or more accounting servers.
retries *index* | **all**	Resets the retries to the default value of 2 on one or more accounting servers.
timeout *index* | **all**	Resets the timeout to 5 seconds on one or more accounting servers.
intervalminimum	Resets the minimum interval to 600 seconds.
updateinterval	Resets the update interval to 1800 seconds.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to reset the RADIUS accounting timeout to 5 seconds on all servers:

```
Matrix(rw)->clear radius accounting timeout all
```

13.3.3 Configuring RFC 3580

About RFC 3580

RFC 3580 provides suggestions on how 802.1x Authenticators should leverage RADIUS as the backend AAA infrastructure. RFC 3580 is divided into several major sections: RADIUS Accounting, RADIUS Authentication, RC4 EAPOL-Key-Frame Discussions, and Security Considerations. Upon detection, End-Points (PCs, IP Phones, etc.) may be interrogated by the AAA clients for credentials, which may then be used to authenticate the user and determine the services which should be provided (authorization). During the exchange with the AAA server, the AAA client will present information describing the End-Point and itself. The AAA server will then describe the level of service which should be provided. This may include authentication success, session duration, and class-of-service to be provided.

Enterasys Networks Layer 2 switches utilize two specific attributes to implement the provisioning of service in response to a successful authentication:

- A proprietary Filter-Id, which describes a Policy Profile to be applied to the user.
- The VLAN-Tunnel-Attribute; which defines the base VLAN-ID to be applied to the user (or possibly mapped to an Enterasys Policy Profile).

Purpose

To review and configure RFC 3580 support.

Commands

The commands needed to configure RFC 3580 are listed below and described in the associated section as shown:

- show vlanauthorization (Section 13.3.3.1)
- set vlanauthorization (Section 13.3.3.2)
- clear vlanauthorization (Section 13.3.3.3)

13.3.3.1 show vlanauthorization

Use this command to display the VLAN Authorization settings.

show vlanauthorization [*port-list*] | [**all**]

Syntax Description

port-list	(Optional) Displays the port(s) VLAN Authorization settings.
all	(Optional) Displays all port(s) VLAN Authorization settings.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no parameters are specified, all VLAN Authorization configuration information will be displayed.

Example

This example shows how to display VLAN Authorization configuration information for ports ge.1.1-3:

```
Matrix(su)->show vlanauthorization ge.1.1-3
 VLAN Authorization Global Status:  enabled
 VLAN Authorization Table   :

 Port       Status       Admin Egress   Oper Egress    VLAN ID
-------------------------------------------------------------
 ge.1.1     enabled      untagged       untagged       4094
 ge.1.2     disabled     untagged       untagged       none
 ge.1.3     enabled      untagged       untagged       unknown
```

13.3.3.2 set vlanauthorization

Use this command to set the VLAN Authorization attributes.

set vlanauthorization enable | disable | port *port-list* {[**enable | disable**] **none | tagged | untagged | dynamic**}

Syntax Description

enable | disable	**enable -** Enable VLAN Authorization. **disable -** Disable VLAN Authorization.
port *port-list*	(Optional) Set port(s) attributes for VLAN Authorization.
enable | disable	**enable -** Enable port VLAN Authorization. **disable -** Disable port VLAN Authorization.
none | tagged | untagged | dynamic	**none** - No egress change will be made. **tagged** - Port added to egress. **untagged** - Port added to untagged egress. **dynamic** - Use information in authentication response.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to enable VLAN Authorization:

```
Matrix(su)->set vlanauthorization enable
```

This example shows how to enable VLAN Authorization for port ge.1.1 for tagged packets:

```
Matrix(su)->set vlanauthorization port ge.1.1 enable tagged
```

13.3.3.3 clear vlanauthorization

Use this command to clear the VLAN Authorization attributes to the defaults.

clear vlanauthorization *port-list* **all**

Syntax Description

port-list	(Optional) Clear port(s) attributes for VLAN Authorization.
all	Clear all VLAN Authorization to the defaults.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to clear VLAN Authorization:

```
Matrix(su)->clear vlanauthorization
```

This example shows how to clear VLAN Authorization for ports ge.1.1-4:

```
Matrix(su)->clear vlanauthorization ge.1.1-4
```

13.3.4 Configuring TACACS+

Purpose

To perform the following:

- Review the TACACS+ client/server configuration on the device.
- Enable or disable the TACACS+ client.
- Set local and remote login options.
- Set server parameters, including IP address, timeout period, server port, and secret.
- Reset TACACS+ client and server settings to default values.

Commands

The commands used to review and configure TACACS+ are listed below and described in the associated section as shown:

- show tacacs (Section 13.3.4.1)
- set tacacs (Section 13.3.4.2)
- clear tacacs (Section 13.3.4.3)

13.3.4.1 show tacacs

Use this command to display the current TACACS+ client/server configuration.

show tacacs [**state** || **session** {[**accounting**] | [**authorization**]} | [**state**] || **command** {[**accounting**] | [**authorization**]} | [**state**]|| **single connection** [**state**] || **server** {*index* | **all**}]

Syntax Description

state	(Optional) Displays the TACACs client's enable status.
session	(Optional) Displays the TACACS client sessions settings
command	(Optional) Displays the TACACS client command settings
singleconnect	(Optional) Displays the TACACS server singleconnect information.
server	(Optional) Displays the TACACS server configuration.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no parameters are specified, all TACACS+ configuration information will be displayed.

Example

This example shows how to display TACACS configuration information:

```
Matrix E7 Platinum(su)->show tacacs
 TACACS+ state:                          enabled
 TACACS+ session accounting state:       disabled
 TACACS+ command authorization state:    disabled
 TACACS+ command accounting state:       disabled
 TACACS+ single-connect state:           disabled
 TACACS+ service:                        exec
 TACACS+ session authorization A-V pairs:
         access level attribute                          value
         read-only   'priv-lvl'                          '0'
         read-write  'priv-lvl'                          '1'
         super-user  'priv-lvl'                          '15'
 TACACS+ Server  IP Address       Port   Timeout  Status
 --------------  ---------------  -----  -------  -------
   1               10.1.26.245     49       10     Active
```

Table 13-2 provides an explanation of the command output.

Table 13-2 show Tacacs+ Output Details

Output	What It Displays...
TACACS+ state	Whether the TACACS+ client is **enabled** or **disabled**.
TACACS+ session accounting state	Whether the TACACS+ client session accounting state is **enabled** or **disabled.**
TACACS+ command authorization state	Whether the TACACS+ client command authorization state is **enabled** or **disabled**.
TACACS+ command accounting state	Whether the TACACS+ client command accounting state is **enabled** or **disabled**.
TACACS+ singleconnect state	Whether the TACACS+ server singleconnect state is **enabled** or **disabled**.
TACACS+ service	The service to be requested for management session authorization

Table 13-2 show Tacacs+ Output Details (Continued)

Output	What It Displays...
TACACS+ session authorization on A-V pairs	Value of the TACACS+ service attributes
TACACS+ Server	Displays the TACACS+ server, along with the it's ip address, port, timeout, and status values.

13.3.4.2 set tacacs

Use this command to enable, disable, or configure TACACS+ authentication.

set tacacs [{**enable** | **disable**}|| **server** {*index* | **all** *address port* [*secret*] | **timeout** *timeout*} || **session** {**authorization** | **accounting service**} *service* | **read-only** *attribute* | **read-write** *attribute* | **super-user** *attribute* [*value*] [**disable** | **enable**] || **command** {**accounting** | **authorization** {**disable** | **enable**}} || **singleconnect** {**disable** | **enable**}]

NOTE: The TACACS client can be enabled on the switch anytime (with or without TACACS server online). If the TACACS server is offline and TACACS is enabled, the authentication login is switched to RADIUS or local if enabled.

Syntax Description

enable | **disable**	Enables or disables the TACACS client.
server {*index* | **all** *address port* [*secret*] | **timeout** *timeout*}	Sets the TACACS+ server configuration. **Index**, the tacacs server index, 1 - 21474783647. **All,** sets all servers. **Address**, the tacacs server IP address. **Port**, the tacacs authentication server TCP port, 0 - 65535. **Secret**, the tacacs server shared secret. **Timeout,** the timeout value in seconds, 1 -180.
session {**authorization** | **accounting service**} *service* | **read-only** *attribute* | **read-write** *attribute* | **super-user** *attribute* [*value*] [**disable** | **enable**]	Sets the TACACS+ session attributes. **Authorization**, set session authorization attributes. **Accounting**, set session accounting attributes. **Service**, value of service. **Read-only**, value of read-only attribute. **Read-write**, value of read-write attribute. **Super-user**, value of super-user attribute. **Value**, value of corresponding attrib value pair. **Disable**, Disables the tacacs client. **Enable**, enables the tacacs client

command {**accounting** | **authorization** {**disable** | **enable**}}	Sets the TACACS+ command attributes **Accounting**, set session accounting attributes. **Authorization**, set session authorization attributes. **Disable**, disables the tacacs client. **Enable**, Enables the tacacs client.
singleconnect {**disable** | **enable**}	Enable or disable ability to send multiple requests over a single connection.

Command Type
Switch command.

Command Mode
Read-Write.

Command Defaults
None.

Examples
This example shows how to enable the TACACS+ client for authenticating with TACACS+ server index number 1 at IP address 10.1.26.145, TCP authentication port 49, and an authentication password of "my3sons". As previously noted, the "server secret" password entered here must match that already configured on the TACACS server:

```
Matrix(rw)->set tacacs server 1 10.1.26.145 49 my3sons
```

This example enables TACACS+ authorization:

```
Matrix(rw)->set tacacs command authorization enable
```

This example enables TACACS+ accounting:

```
Matrix(rw)->set tacacs command accounting enable
```

This example enables TACAS+ session accounting:

```
Matrix(rw)->set tacacs session accounting enable
```

13.3.4.3 clear tacacs

Use this command to clear TACACS+ settings.

clear tacacas [[**session**] **authorization** { [**service**] [**read-only**] [**read-write**] [**super-user**] }] || [[**server**] *index* | **all** [*timeout*]]

Syntax Description

session	Clears the TACACS+ session parameters
authorization	Clears the TACACS+ session accounting parameters
service	Clears the TACACS+ session authorization service
read-only	Clears the TACACS+session authorization read-only
read-write	Clears the TACACS+session authorization read-write
super-user	Clears the TACACS+session authorization super-user
index | **all**	Resets settings for a specified server or all TACACS+ servers.
timeout	Resets the TACACS+ timeout value to default value of 10 seconds.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to clear all settings on all TACACS+ servers:

```
Matrix(rw)->clear tacacs server all
```

This example shows how to reset the TACACS+ timeout to the default value of 10 seconds:

```
Matrix(rw)->clear tacacs server timeout
```

13.3.5 Configuring 802.1X Authentication

About Multi-User Authentication

Enterasys Networks' enhanced version of the IEEE 802.1X-2001 specification decreases security vulnerabilities inherent with the standard implementation, and allows multiple devices and users — also known as "supplicants" — to be authenticated on a single port. The enhanced standard clearly distinguishes each network access port from its access "entities" — which maintain authentication instructions associated with each unique potential supplicant.

802.1X enhancements are backwards-compatible with existing 802.1X supplicants and configurations, and are designed to seamlessly integrate into Enterasys' per-user policy management system; allowing much more granular control over user authorization.

Enterasys' multi-user 802.1X implementation includes the following components:

- A Multi-Mode Enabled Matrix System - only when a system is set to operate in multiple authentication mode (as described in Section 13.3.10) can the enhanced 802.1X feature be used. The system's ports intended for network access to authenticate and authorize supplicants will be allowed to simultaneously utilize more than one access entity.
- Access Entities - responsible for maintaining state, counters, and statistics for an individual supplicant. An access entity is activated from a pool of configured access entities when a potential supplicant on a port needs to be authenticated. It becomes deactivated when the supplicant logs off, cannot be authenticated, or the Matrix device determines that the supplicant or associated policy settings are no longer valid.
- Supplicants - devices or users that desire access to the network, such as workstations, printers, PDAs, or hard-wired or wireless phones. These will be identified by the system using a combination of connection port, MAC addresses, and allocated access entity index. Once a supplicant is successfully authenticated, the system is responsible for enforcing the degree to which the supplicant will be authorized to access the network, using information sent to it by the authentication server.
- Authentication Server--- Typically a RADIUS authority where the Matrix system and server have mutually-configured knowledge of one another.

Purpose

To review and configure 802.1X authentication for one or more ports using EAPOL (Extensible Authentication Protocol). 802.1X controls network access by enforcing user authorization on selected ports, which results in allowing or denying network access according to RADIUS server configuration.

Commands

The commands used to review and configure 802.1X are listed below and described in the associated section as shown:

- show dot1x (Section 13.3.5.1)
- show dot1x auth-config (Section 13.3.5.2)
- set dot1x (Section 13.3.5.3)
- set dot1x auth-config (Section 13.3.5.4)
- clear dot1x auth-config (Section 13.3.5.5)

13.3.5.1 show dot1x

Use this command to display 802.1X status, diagnostics, statistics, and reauthentication or initialization control information for one or more ports.

show dot1x [**auth-config** | **access-entity** | **auth-diag** | **auth-session-stats** **auth-stats** [**all**] [*port-string*] [**index** *index-list*] | [**mac** [**all**] *mac* [*port-string*] [**index** *index-list*] | [**port** [**init** | **reauth**]] [*port-string*]]

Syntax Description

auth-config	(Optional) Displays authentication configuration information.
access-entity	(Optional) Displays access entity information.
auth-diag	(Optional) Displays authentication diagnostics information.
auth-session-stats	(Optional) Displays authentication session statistics.
auth-stats	(Optional) Displays authentication statistics.
all	(Optional) Displays inactive and active authentication entries.
mac all *mac*	Displays information for one or all MAC addresses.
index *index-list*	(Optional) Displays information for one or more access entities. Valid values are 0 - 8191.
port init | **reauth**	(Optional) Displays the status of port initialization and reauthentication control.
port-string	(Optional) Displays information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

- If no parameters are specified, 802.1X status will be displayed.
- If **all** is not specified, only active entries will be displayed.

- If *index* is not specified, information for all access entities will be displayed.
- If *port-string* is not specified, information for all ports will be displayed.

Examples

This example shows how to display 802.1X status:

```
Matrix(rw)->show dot1x
DOT1X is disabled.
```

This example shows how to display authentication diagnostics information for fe.1.1:

```
Matrix(rw)->show dot1x auth-diag fe.1.1

 Port: 1     Auth-Diag:
 Enter Connecting:                    0
 EAP Logoffs While Connecting:        0
 Enter Authenticating:                0
 Success While Authenticating:        0
 Timeouts While Authenticating:       0
 Fail While Authenticating:           0
 ReAuths While Authenticating:        0
 EAP Starts While Authenticating:     0
 EAP Logoff While Authenticating:     0
 ReAuths While Authenticated:         0
 EAP Starts While Authenticated:      0
 EAP Logoff While Authenticated:      0
 Backend Responses:                   0
 Backend Access Challenges:           0
 Backend Other Requests To Supp:      0
 Backend NonNak Responses From Supp:  0
 Backend Auth Successes:              0
 Backend Auth Fails:                  0
```

This example shows how to display authentication session statistics for fe.1.1:

```
Matrix(rw)->show dot1x auth-session-stats fe.1.1

 Port: 1     Auth-Session-Stats:
 Session Octets Rx:         0
 Session Octets Tx:         0
 Session Frames Rx:         0
 Session Frames Tx:         0
 Session Id:                (1, 00-00-00-00-00-00)
 Session Authentic Method: Remote Auth Server
 Session Time:              0 secs
 Session Terminate Cause:  Port Failure
 Session UserName:
```

This example shows how to display authentication statistics for fe.1.1:

```
Matrix(rw)->show dot1x auth-stats fe.1.1

 Port: 1     Auth-Stats:
 EAPOL Frames Rx:            0
 EAPOL Frames Tx:            0
 EAPOL Start Frames Rx:      0
 EAPOL Logoff Frames Rx:     0
 EAPOL RespId Frames Rx:     0
 EAPOL Resp Frames Rx:       0
 EAPOL ReqId Frames Tx:      0
 EAPOL Req Frames Tx:        0
 Invalid EAPOL Frames Rx:    0
 EAP Length Error Frames Rx: 0
 Last EAPOL Frame Version:   0
 Last EAPOL Frame Source:    0:0:0:0:0:0
```

13.3.5.2 show dot1x auth-config

Use this command to display 802.1X authentication configuration settings for one or more ports.

show dot1x auth-config [**authcontrolled-portcontrol**] [**keytxenabled**] [**maxreq**] [**quietperiod**] [**reauthenabled**] [**reauthperiod**] [**servertimeout**] [**supptimeout**] [**txperiod**] [*port-string*]

Syntax Description

authcontrolled-portcontrol	(Optional) Displays the current value of the controlled Port control parameter for the Port.
keytxenabled	(Optional) Displays the state of 802.1X key transmission currently in use by the authenticator PAE state machine.
maxreq	(Optional) Displays the value set for maximum requests currently in use by the backend authentication state machine.
quietperiod	(Optional) Displays the value set for quiet period currently in use by the authenticator PAE state machine.
reauthenabled	(Optional) Displays the state of reauthentication control used by the Reauthentication Timer state machine.
reauthperiod	(Optional) Displays the value, in seconds, set for the reauthentication period used by the reauthentication timer state machine.
servertimeout	(Optional) Displays the server timeout value, in seconds, currently in use by the backend authentication state machine.
supptimeout	(Optional) Displays the authentication supplicant timeout value, in seconds, currently in use by the backend authentication state machine.
txperiod	(Optional) Displays the transmission period value, in seconds, currently in use by the authenticator PAE state machine.
port-string	(Optional) Limits the display of desired information information to specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

- If no parameters are specified, all 802.1X settings will be displayed.
- If *port-string* is not specified, information for all ports will be displayed.

Examples

This example shows how to display the EAPOL port control mode for fe.1.1:

```
Matrix(rw)->show dot1x auth-config authcontrolled-portcontrol fe.1.1
Port 1: Auth controlled port control:             Auto
```

This example shows how to display the 802.1X quiet period settings for fe.1.1:

```
Matrix(rw)->show dot1x auth-config quietperiod fe.1.1
 Port 1: Quiet period:         30
```

This example shows how to display all 802.1X authentication configuration settings for fe.2.24:

```
Matrix(rw)->show dot1x fe.2.24
Port: fe.2.24    Auth-Config:
PAE state                              : Initialize
Backend auth State                     : Initialize
Admin controlled directions            : Both
Oper controlled directions             : Both
Auth controlled port status            : Unauthorized
Auth controlled port control           : Auto
Quiet period                           : 60 seconds
Tx period                              : 30 seconds
Supp Timeout                           : 30 seconds
Server Timeout                         : 30 seconds
Max requests                           : 2
Reauthentication period                : 3600 seconds
Reauthentication enabled               : FALSE
Key tx enabled                         : FALSE
```

13.3.5.3 set dot1x

Use this command to enable or disable 802.1X authentication, to reauthenticate one or more access entities, or to reinitialize one or more supplicants.

set dot1x {[**enable** | **disable**] [**init** | **reauth** [*port-string*] [**index** *index-list*]}

Syntax Description

enable | **disable**	Enables or disables 802.1X.
init | reauth	Reinitializes one or more access entities or reauthenticates one or more supplicants.
port-string	(Optional) Specifies the port(s) to reinitialize or reauthenticate.
index *index-list*	(Optional) Specifies one or more access entities on which to enable initialization or reauthentication control. Valid values are **0 - 8191**.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If not specified, the reinitialization or reauthentication setting will be applied to all ports.

If *index* is not specified, all access entities will be affected.

Examples

This example shows how to enable 802.1X:

```
Matrix(rw)->set dot1x enable
```

This example shows how to reinitialize fe.2.24:

```
Matrix(rw)->set dot1x init fe.2.24
```

13.3.5.4 set dot1x auth-config

Use this command to configure 802.1X authentication.

set dot1x auth-config {[**authcontrolled-portcontrol** {**auto** | **forced-auth** | **forced-unauth**}] [**keytxenabled**{**false** | **true**}] [**maxreq** *value*] [**quietperiod** *value*] [**reauthenabled** {**false** | **true**}] [**reauthperiod** *value*] [**servertimeout** *timeout*] [**supptimeout** *timeout*] [**txperiod** *value*]} [*port-string*]

Syntax Description

authcontrolled-portcontrol auto | **forced-auth** | **forced-unauth**	Specifies the EAPOL port control mode as: • **auto** - Auto authorization mode (default). The Matrix system will only forward frames received on a port which are considered authenticated according to the state of the corresponding access entity. • **forced-auth** - Forced authorized mode, which effectively disables 802.1X authentication on the port, and allows all frames received on the port to be forwarded. • **forced-unauth** - Forced unauthorized mode, which effectively disables 802.1X authentication on the port. When 802.1X is the only active authentication agent on a given port, this setting means all frames received will be dropped.
keytxenabled false | **true**	Enables (**true**) or disables (**false**) 802.1X key transmission by the authenticator PAE state machine.
maxreq *value*	Specifies the maximum number of authentication requests allowed by the backend authentication state machine. Valid values are **1** - **10**.
quietperiod *value*	Specifies the time (in seconds) following a failed authentication before another attempt can be made by the authenticator PAE state machine. Valid values are **0** - **65535**.
reauthenabled false | **true**	Enables (**true**) or disables (**false**) reauthentication control of the reauthentication timer state machine.
reauthperiod *value*	Specifies the time lapse (in seconds) between attempts by the reauthentication timer state machine to reauthenticate a port. Valid values are **0** - **65535**.

servertimeout *timeout*	Specifies a timeout period (in seconds) for the authentication server, used by the backend authentication state machine. Valid values are **1 - 300**.
supptimeout *timeout*	Specifies a timeout period (in seconds) for the authentication supplicant used by the backend authentication state machine. Valid values are **1 - 300**.
txperiod *value*	Specifies the period (in seconds) which passes between authenticator PAE state machine EAP transmissions. Valid values are **1 - 65535**.
port-string	(Optional) Limits the configuration of desired settings to specified port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified, authentication parameters will be set on all ports

Examples

This example shows how to set EAPOL port control to forced authorized mode on ports fe.1.1-5, which disables authentication on these ports:

```
Matrix(rw)->set dot1x auth-config authcontrolled-portcontrol forced-auth
fe.1.1-5
```

This example shows how to enable reauthentication control on ports fe.1.1-3:

```
Matrix(rw)->set dot1x auth-config reathenabled true fe.1.1-3
```

This example shows how to set the 802.1X quiet period to 120 seconds on ports fe.1.1-3:

```
Matrix(rw)->set dot1x auth-config quietperiod 120 fe.1.1-3
```

13.3.5.5 clear dot1x auth-config

Use this command to reset 802.1X authentication parameters to default values on one or more ports.

clear dot1x auth-config [**authcontrolled-portcontrol**] [**keytxenabled**] [**maxreq**] [**quietperiod**] [**reauthenabled**] [**reauthperiod**] [**servertimeout**] [**supptimeout**] [**txperiod**] [*port-string*]

Syntax Description

authcontrolled-portcontrol	(Optional) Resets the 802.1X port control mode to **auto**.
keytxenabled	(Optional) Resets the 802.1X key transmission state to disabled (**false**).
maxreq	(Optional) Resets the maximum requests value to **2**.
quietperiod	(Optional) Resets the quiet period value to **60** seconds.
reauthenabled	(Optional) Resets the reauthentication control state to disabled (**false**).
reauthperiod	(Optional) Resets the reauthentication period value to 3**600** seconds.
servertimeout	(Optional) Resets the server timeout value to **30** seconds.
supptimeout	(Optional) Resets the authentication supplicant timeout value to **30** seconds.
txperiod	(Optional) Resets the transmission period value to **30** seconds.
port-string	(Optional) Resets settings on specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

- If no parameters are specified, all authentication parameters will be reset.
- If *port-string* is not specified, parameters will be set on all ports.

Examples

This example shows how to reset the 802.1X port control mode to auto on all ports:

```
Matrix(rw)->clear dot1x auth-config authcontrolled-portcontrol
```

This example shows how to reset reauthentication control to disabled on ports fe.1.1-3:

```
Matrix(rw)->clear dot1x auth-config reauthenabled fe.1.1-3
```

This example shows how to reset the 802.1X quiet period to 60 seconds on ports fe.1.1-3:

```
Matrix(rw)->clear dot1x auth-config quietperiod fe.1.1-3
```

13.3.6 Configuring Port Web Authentication (PWA)

About PWA

PWA provides a way of authenticating users before allowing general access to the network. A PWA user's access to the network is restricted until after the user successfully logs in via a web browser using the Enterasys Networks' Matrix Series web-based security interface. The Matrix Series device will validate all login credential from the user with a RADIUS server before allowing network access.

PWA is an alternative to 802.1X and MAC authentication. It allows only the essential protocols and services required by the authentication process between the end-station and the network. All other traffic is discarded. When a user is in the unauthenticated state, any user traffic requesting network resources will not be allowed.

To log on using PWA, the user makes a request via a web browser for the PWA web page or is automatically redirected to this login page after requesting a URL in a browser.

Depending upon the authenticated state of the user, a login page or a logout page will display. When a user submits username and password, the switch then authenticates the user via a preconfigured RADIUS server. If the login is successful, then the user will be granted full network access according to the user's policy configuration on the switch.

PWA Configuration Considerations

In order to optimize PWA authentication on the Matrix Series device, the device must be configured to satisfy the minimum requirements of an authenticating client needing to send an HTTP request with its web browser. Typically, the client will need DNS and ARP resolution before it can generate the HTTP request needed to do a PWA login. Also, DHCP may be needed in many environments. These services are not provided by PWA and must be provided by the network. To accomplish this, the device must be configured to allow access to the needed services.

The first step is to make sure that the multiple authentication port mode settings are set to "auth-opt" on all ports that are configured to run PWA.

Example

This example shows how to set the multiple authentication port mode to "auth-opt" for all Fast Ethernet ports in the chassis or standalone device:

```
Matrix(rw)->set multiauth port mode auth-opt fe.*.*
```

For details on using the **set multiauth port** command, refer to Section 13.3.10.6.

Setting the port mode in this fashion will allow traffic to flow through the port without authentication according to its configuration. By default, this would allow all traffic to be forwarded. Conversely, you could configure the ports to drop all traffic, but this is not the most effective solution. Better yet would be to configure the port to provide only the minimal services and nothing more. The most powerful tool for accomplishing this goal is policy configuration. Policies provide the flexibility needed to tailor these services to the configuration and security needs of your environment.

Examples

This example shows how to configure a policy profile that will discard all traffic by default:

```
Matrix(rw)->set policy profile 1 name "Unauthenticated User" pvid 0 pvid-status
enable
```

This example shows how to configure policy profile rule 1 that will enable the selective services required for PWA. This rule will:

- forward ARP requests,
- allow access to a server (at IP 1.2.3.4) that acts as both a DNS and DHCP server, and
- be assigned as the default policy profile for all Fast Ethernet ports.

```
Matrix(rw)->set policy rule 1 ether 0x806 forward
Matrix(rw)->set policy rule 1 ipdest 1.2.3.4 forward
Matrix(rw)->set policy rule 1 udpdest 67 forward
Matrix(rw)->set policy rule 1 updsource 68 forward
Matrix(rw)->set policy port fe.*.* 1
```

Also, the PWA client must be configured (statically, or through DHCP) to have routes to both the resolved URL (a local route, or an actual gateway) and the PWA IP address. DHCP may be configured to explicitly return a static route for the client, or to inform the client that all routes are local (meaning the client is its own default gateway).

For more information on configuring policy profiles, refer to Chapter 7.

For more information on configuring DHCP, refer to Section 11.2.9.

Purpose

To review, enable, disable, and configure Port Web Authentication (PWA).

Commands

The commands needed to review and configure PWA are listed below and described in the associated section as shown:

- show pwa (Section 13.3.6.1)
- set pwa (Section 13.3.6.2)
- set pwa hostname (Section 13.3.6.3)
- clear pwa hostname (Section 13.3.6.4)
- show pwa banner (Section 13.3.6.5)
- set pwa banner (Section 13.3.6.6)
- clear pwa banner (Section 13.3.6.7)
- set pwa displaylogo (Section 13.3.6.8)
- set pwa redirecttime (Section 13.3.6.9)
- set pwa ipaddress (Section 13.3.6.10)
- set pwa protocol (Section 13.3.6.11)
- set pwa enhancedmode (Section 13.3.6.12)
- set pwa guestname (Section 13.3.6.13)
- clear pwa guestname (Section 13.3.6.14)
- set pwa guestpassword (Section 13.3.6.15)
- set pwa gueststatus (Section 13.3.6.16)
- set pwa initialize (Section 13.3.6.17)
- set pwa quietperiod (Section 13.3.6.18)
- set pwa maxrequests (Section 13.3.6.19)
- set pwa portcontrol (Section 13.3.6.20)
- show pwa session (Section 13.3.6.21)

13.3.6.1 show pwa

Use this command to display port web authentication information for one or more ports.

show pwa [*port-string*]

Syntax Description

port-string	(Optional) Displays PWA information for specific port(s).

Command Defaults

If *port-string* is not specified, PWA information will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display PWA information for ge.2.1:

```
Matrix(rw)->show pwa ge.2.1
PWA Status                    - enabled
PWA IP Address                - 192.168.62.99
PWA Protocol                  - PAP
PWA Enhanced Mode             - N/A
PWA Logo                      - enabled
PWA Guest Networking Status - disabled
PWA Guest Name                - guest
PWA Redirect Time             - N/A

Port     Mode               AuthStatus      QuietPeriod  MaxReq
-------- ----------------  --------------  -----------  ---------
ge.2.1   foreauthorized    disconnected    60           16
```

Table 13-3 provides an explanation of the command output.

Table 13-3 show pwa Output Details

Output	What It Displays...
PWA Status	Whether or not port web authentication is enabled or disabled. Default state of disabled can be changed using the **set pwa** command as described in Section 13.3.6.2.
PWA IP Address	IP address of the end station from which PWA will prevent network access until the user is authenticated. Set using the **set pwa ipaddress** command as described in Section 13.3.6.10.
PWA Protocol	Whether PWA protocol is CHAP or PAP. Default setting of PAP can be changed using the set pwa protocol command as described in Section 13.3.6.11.
PWA Enhanced Mode	Whether PWA enhanced mode is enabled or disabled. Default state of disabled can be changed using the **set pwa enhancedmode** command as described in Section 13.3.6.12.
PWA Logo	Whether the Enterasys Networks logo will be displayed or hidden at user login. Default state of enabled (displayed) can be changed using the **set pwa displaylogo** command as described in Section 13.3.6.8.
PWA Guest Networking Status	Whether PWA guest user status is disabled or enabled with RADIUS or no authentication. Default state of disabled can be changed using the **set pwa gueststatus** command as described in Section 13.3.6.16.
PWA Guest Name	Guest user name for PWA enhanced mode networking. Default value of "guest" can be changed using the **set pwa guestname** command as described in Section 13.3.6.13.
PWA Guest Password	Guest user's password. Default value of an empty string can be changed using the **set pwa guestpassword** command as described in Section 13.3.6.15.
PWA Redirect Time	Time in seconds after login success before the user is redirected to the PWA home page. Default of 5 can be reset using the **set pwa redirecttime** command as described in Section 13.3.6.9.
Port	PWA port designation.

Table 13-3 show pwa Output Details (Continued)

Output	What It Displays...
Mode	PWA port control mode.
Auth Status	Whether or not the port state is disconnected, authenticating authenticated, or held (authentication has failed).
Quiet Period	Amount of time a port will be in the held state after a user unsuccessfully attempts to log on to the network. Default value of 60 can be changed using the **set pwa quietperiod** command as described in Section 13.3.6.18.
MaxReq	Maximum number of log on attempts allowed before transitioning the port to a held state. Default value of 2 can be changed using the **set pwa maxrequests** command as described in Section 13.3.6.19.

13.3.6.2 set pwa

Use this command to enable or disable port web authentication.

set pwa {**enable** | **disable**}

NOTE: Port Web Authentication cannot be enabled if either MAC authentication or EAPOL (802.1X) is enabled. For information on disabling 802.1X, refer to Section 13.3.5.3. For information on disabling MAC authentication, refer to Section 13.3.7.3.

Syntax Description

enable | **disable**	Enables or disables port web authentication.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable port web authentication:

```
Matrix(rw)->set pwa enable
```

13.3.6.3 set pwa hostname

Use this command to set a port web authentication host name. This is a URL for accessing the PWA login page.

set pwa hostname *name*

Syntax Description

name	Specifies a name for accessing the PWA login page.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the PWA host name to “pwahost”:

```
Matrix(rw)->set pwa hostname pwahost
```

13.3.6.4 clear pwa hostname

Use this command to clear the port web authentication host name.

clear pwa hostname

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the PWA host name:

```
Matrix(rw)->clear pwa hostname
```

13.3.6.5 show pwa banner

Use this command to display the port web authentication login banner string.

show pwa banner

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the PWA login banner:

```
Matrix(rw)->show pwa banner
Welcome to Enterasys Networks
```

13.3.6.6 set pwa banner

Use this command to configure a string to be displayed as the PWA login banner.

set pwa banner *string*

Syntax Description

string	Specifies the PWA login banner.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the PWA login banner to “Welcome to Enterasys Networks”:

```
Matrix(rw)->set pwa banner "Welcome to Enterasys Networks"
```

13.3.6.7 clear pwa banner

Use this command to reset the PWA login banner to a blank string.

clear pwa banner

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the PWA login banner to a blank string

```
Matrix(rw)->clear pwa banner
```

13.3.6.8 set pwa displaylogo

Use this command to set the display options for the Enterasys Networks logo.

set pwa displaylogo {**display** | **hide**}

Syntax Description

display | **hide**	Displays or hides the Enterasys Networks logo when the PWA website displays.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to hide the Enterasys Networks logo:

```
Matrix(rw)->set pwa displaylogo hide
```

13.3.6.9 set pwa redirecttime

Use this command to set the PWA login success page redirect time.

set pwa redirecttime *time*

Syntax Description

time	Specifies the number of seconds before the user will be redirected to the PWA home page after successful login. Valid values are **0 - 120**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the PWA redirect time to 10 seconds:

```
Matrix(rw)->set pwa redirecttime 10
```

13.3.6.10 set pwa ipaddress

Use this command to set the PWA IP address. This is the IP address of the end station from which PWA will prevent network access until the user is authenticated.

set pwa ipaddress *ip-address*

Syntax Description

ip-address	Specifies a globally unique IP address. This same value must be configured into every authenticating switch in the domain.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set a PWA IP address of 1.2.3.4:

```
Matrix(rw)->set pwa ipaddress 1.2.3.4
```

13.3.6.11 set pwa protocol

Use this command to set the port web authentication protocol.

set pwa protocol {**chap** | **pap**}

Syntax Description

chap | **pap**	Sets the PWA protocol to: • CHAP (PPP Challenge Handshake Protocol) - encrypts the username and password between the end-station and the switch port. • PAP (Password Authentication Protocol- does not provide any encryption between the end-station the switch port.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set a the PWA protocol to CHAP:

```
Matrix(rw)->set pwa protocol chap
```

13.3.6.12 set pwa enhancedmode

Use this command to enable or disable PWA enhanced mode. When enabled, users on unauthenticated PWA ports can type any URL into a browser and be presented the PWA login page on their initial web access. They will also be granted guest networking privileges.

set pwa enhancedmode {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables PWA enhanced mode.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable PWA enhanced mode:

```
Matrix(rw)->set pwa enhancedmode enable
```

13.3.6.13 set pwa guestname

Use this command to set a guest user name for PWA enhanced mode networking. When enhanced mode is enabled (as described in Section 13.3.6.12), PWA will use this name to grant network access to guests without established login names and passwords.

set pwa guestname *name*

Syntax Description

name	Specifies a guest user name.

Command Type

Switch command.

Command Defaults

None.

Command Mode

Read-Write.

Example

This example shows how to set the PWA guest user name to “guestuser”:

```
Matrix(rw)->set pwa guestname guestuser
```

13.3.6.14 clear pwa guestname

Use this command to clear the PWA guest user name.

clear pwa guestname

Syntax Description

None.

Command Type

Switch command.

Command Defaults

None.

Command Mode

Read-Write.

Example

This example shows how to clear the PWA guest user name

```
Matrix(rw)->clear pwa guestname
```

13.3.6.15 set pwa guestpassword

Use this command to set the guest user password for PWA networking. When enhanced mode is enabled, (as described in Section 13.3.6.12) PWA will use this password and the guest user name to grant network access to guests without established login names and passwords.

set pwa guestpassword

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the PWA guest user password name:

```
Matrix(rw)->set pwa guestpasword
Guest Password: *********
Retype Guest Password: *********
```

13.3.6.16 set pwa gueststatus

Use this command to enable or disable guest networking for port web authentication. When enhanced mode is enabled (as described in Section 13.3.6.12), PWA will use a guest password and guest user name to grant network access with default policy privileges to users without established login names and passwords.

set pwa gueststatus {**authnone** | **authradius** | **disable**}

Syntax Description

authnone	Enables guest networking with no authentication method.
authradius	Enables guest networking with RADIUS authentication. Upon successful authentication from RADIUS, PWA will apply the policy returned from RADIUS to the PWA port.
disable	Disables guest networking.

Command Type

Switch command.

Command Defaults

None.

Command Mode

Read-Write.

Example

This example shows how to enable PWA guest networking with RADIUS authentication:

```
Matrix(rw)->set pwa guestnetworking authradius
```

13.3.6.17 set pwa initialize

Use this command to initialize a PWA port to its default unauthenticated state.

set pwa initialize [*port-string*]

Syntax Description

port-string	(Optional) Initializes specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Defaults

If *port-string* is not specified, all ports will be initialized.

Command Mode

Read-Write.

Example

This example shows how to initialize ports fe.1.5-7:

```
Matrix(rw)->set pwa initialize fe.1.5-7
```

13.3.6.18 set pwa quietperiod

Use this command to set the amount of time a port will remain in the held state after a user unsuccessfully attempts to log on to the network.

set pwa quietperiod *time* [*port-string*]

Syntax Description

time	Specifies quiet time in seconds.
port-string	(Optional) Sets the quiet period for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Defaults

If *port-string* is not specified, quiet period will be set for all ports.

Command Mode

Read-Write.

Example

This example shows how to set the PWA quiet period to 30 seconds for ports fe.1.5-7:

```
Matrix(rw)->set pwa quietperiod 30 fe.1.5-7
```

13.3.6.19 set pwa maxrequests

Use this command to set the maximum number of log on attempts allowed before transitioning the PWA port to a held state.

set pwa maxrequests *requests* [*port-string*]

Syntax Description

maxrequests	Specifies the maximum number of log on attempts.
port-string	(Optional) Sets the maximum requests for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Defaults

If *port-string* is not specified, maximum requests will be set for all ports.

Command Mode

Read-Write.

Example

This example shows how to set the PWA maximum requests to 3 for all ports:

```
Matrix(rw)->set pwa maxrequests 3
```

13.3.6.20 set pwa portcontrol

Use this command to set the PWA port control mode.

set pwa portcontrol {**auto** | **forceauthorized** | **forceunauthorized** | **promiscuousauto**} [*port-string*]

Syntax Description

auto	Sets the port to auto mode. In this mode, the port is filtering traffic. Login/Logout screens are available, as is the PWA IP. Spoofing (ARP, DNS, WINS and DHCP) will respond to requests. If a default policy exists on the port, it will be ignored in the unauthenticated state. **NOTE:** In order for PWA enhanced mode to operate, port control mode must be set to auto.
forceauthorized	Sets the port to force authorized mode. In this mode, the port is transmitting and receiving traffic. The Web server Login/Logout screens are inaccessible, as is the PWA IP. Spoofing (ARP, DNS, WINS or DHCP) will not respond in this mode.
forceunauthorized	Sets the port to force unauthorized mode. In this mode, the port is essentially disabled.
promiscuousauto	Sets the port to promiscuous auto mode. In this mode, no filtering is done unless a default policy applies to the port.
port-string	(Optional) Sets the control mode on specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

If *port-string* is not specified, control mode will be set for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the PWA control mode to auto for all ports:

```
Matrix(rw)->set pwa portcontrol auto
```

13.3.6.21 show pwa session

Use this command to display information about current PWA sessions.

show pwa session [*port-string*]

Syntax Description

port-string	(Optional) Displays PWA session information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Defaults

If *port-string* is not specified, session information for all ports will be displayed.

Command Mode

Read-Only.

Example

This example shows how to display PWA session information:

```
Matrix(rw)->show pwa session
Port     MAC               IP              User          Duration     Status
-------- ----------------- --------------- ------------- ------------ ---------
ge.2.19  00-c0-4f-20-05-4b 172.50.15.121   pwachap10     0,14:46:55   active
ge.2.19  00-c0-4f-24-51-70 172.50.15.120   pwachap1      0,15:43:30   active
ge.2.19  00-00-f8-78-9c-a7 172.50.15.61    pwachap11     0,14:47:58   active
```

13.3.7 Configuring MAC Authentication

Purpose

To review, disable, enable and configure MAC authentication. This allows the device to authenticate source MAC addresses in an exchange with an authentication server. The authenticator (switch) selects a source MAC seen on a MAC-authentication enabled port, and submits it to a backend client for authentication. The backend client uses the MAC address stored password, if required, as credentials for an authentication attempt. If accepted, a string representing an access policy may be returned. If present, the switch applies the associated policy rules. For an information on configuring policy classification, refer back to Chapter 7.

Commands

The commands needed to review, enable, disable, and configure MAC authentication are listed below and described in the associated section as shown:

- show macauthentication (Section 13.3.7.1)
- show macauthentication session (Section 13.3.7.2)
- set macauthentication (Section 13.3.7.3)
- set macauthentication password (Section 13.3.7.4)
- clear macauthentication password (Section 13.3.7.5)
- set macauthentication significant-bits (Section 13.3.7.6)
- clear macauthentication significant-bits (Section 13.3.7.7)
- set macauthentication port (Section 13.3.7.8)
- set macauthentication authallocated (Section 13.3.7.9)
- clear macauthentication authallocated (Section 13.3.7.10)
- set macauthentication portinitialize (Section 13.3.7.11)
- set macauthentication macinitialize (Section 13.3.7.12)
- set macauthentication reauthentication (Section 13.3.7.13)
- set macauthentication portreauthenticate (Section 13.3.7.14)
- set macauthentication macreauthenticate (Section 13.3.7.15)
- set macauthentication reauthperiod (Section 13.3.7.16)

- clear macauthentication reauthperiod (Section 13.3.7.17)
- set macauthentication quietperiod (Section 13.3.7.18)
- clear macauthentication quietperiod (Section 13.3.7.19)

13.3.7.1 show macauthentication

Use this command to display MAC authentication information for one or more ports.

show macauthentication [*port-string*]

Syntax Description

port-string	(Optional) Displays MAC authentication information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If *port-string* is not specified, MAC authentication information will be displayed for all ports.

Examples

This example shows how to display MAC authentication information for ge.1.1 through 8:

```
Router3(su)->show macauthentication ge.1.1-8
MAC authentication:              - disabled
MAC user password:               - NOPASSWORD
Port username significant bits   - 48

 Port      Port     Quiet      Reauth     Auth     Auth        Reauthentications
           State    Period     Period     Allowed  Allocated
 --------  -------- ---------- ---------- -------- ---------   ---------------
 ge.1.1    disabled   0          3600       256      256         disabled
 ge.1.2    disabled   0          3600       256      256         disabled
 ge.1.3    disabled   0          3600       256      256         disabled
 ge.1.4    disabled   0          3600       256      256         disabled
 ge.1.5    disabled   0          3600       256      256         disabled
 ge.1.6    disabled   0          3600       256      256         disabled
 ge.1.7    disabled   0          3600       256      256         disabled
 ge.1.8    disabled   0          3600       256      256         disabled
```

Table 13-4 provides an explanation of the command output.

Table 13-4 show macauthentication Output Details

Output	What It Displays...
MAC authentication	Whether MAC authentication is globally enabled or disabled. Set using the **set macauthentication** command as described in Section 13.3.7.3.
MAC user password	User password associated with MAC authentication on the device. Set using the **set macauthentication password** command as described in Section 13.3.7.4.
Port username significant bits	Number of significant bits in the MAC addresses to be used starting with the left-most bit of the vendor portion of the MAC address. The significant portion of the MAC address is sent as a user-name credential when the primary attempt to authenticate the full MAC address fails. Any other failure to authenticate the full address, (i.e., authentication server timeout) causes the next attempt to start once again with a full MAC authentication. Default is 48 and cannot be reset.
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
Port State	Whether or not MAC authentication is enabled or disabled on this port.
Quiet Period	Enables a reauthentication attempt for failed entries at the period specified in seconds. Default value is 0 (never).
Reauth Period	Reauthentication period for this port. Default value of **30** can be changed using the **set macauthentication reauthperiod** command described in Section 13.3.7.16.
Auth Allowed	Number of concurrent authentications supported on this port. Default is 1 and cannot be reset.
Auth Allocated	Maximum number of MAC authentications permitted on this port. Default is 1 and cannot be reset.
Reauthentications	Whether or not reauthentication is enabled or disabled on this port. Set using the **set macauthentication reauthentication** command described in Section 13.3.7.13.

13.3.7.2 show macauthentication session

Use this command to display the active MAC authenticated sessions.

show macauthentication session

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If *port-string* is not specified, MAC session information will be displayed for all MAC authentication ports.

Example

This example shows how to display MAC session information:

```
Matrix(rw)->show macauthentication session
Port       MAC Address       Duration   Reauth Period   Reauthentications
-----    -----------------   ---------- -------------   -----------------
ge.1.2   00:60:97:b5:4c:07   0,00:52:31  3600           disabled
```

Table 13-5 provides an explanation of the command output.

Table 13-5 show macauthentication session Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
MAC Address	MAC address associated with the session.
Duration	Time this session has been active.

Table 13-5 show macauthentication session Output Details (Continued)

Output	What It Displays...
Reauth Period	Reauthentication period for this port, set using the **set macauthentication reauthperiod** command described in Section 13.3.7.16.
Reauthentications	Whether or not reauthentication is enabled or disabled on this port. Set using the **set macauthentication reauthentication** command described in Section 13.3.7.13.

13.3.7.3 set macauthentication

Use this command to globally enable or disable MAC authentication.

set macauthentication {**enable** | **disable**}

Syntax Description

enable | **disable**	Globally enables or disables MAC authentication.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to globally enable MAC authentication:

```
Matrix(rw)->set macauthentication enable
```

13.3.7.4 set macauthentication password

Use this command to set a MAC authentication password.

set macauthentication password *password*

Syntax Description

password	Specifies a text string MAC authentication password.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to set the MAC authentication password to “macauth”:

```
Matrix(rw)->set macauthentication password macauth
```

13.3.7.5 clear macauthentication password

Use this command to clear the MAC authentication password.

clear macauthentication password

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to clear the MAC authentication password:

```
Matrix(rw)->clear macauthentication password
```

13.3.7.6 set macauthentication significant-bits

Use this command to set the number of significant bits of the MAC address to use for authentication.

set macauthentication significant-bits *number*

Syntax Description

number	Specifies a number of significant bits.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to set the MAC authentication significant bits to 24:

```
Matrix(rw)->set macauthentication significant-bits 24
```

13.3.7.7 clear macauthentication significant-bits

Use this command to clear the MAC authentication significant bits setting.

clear macauthentication significant-bits

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to clear the MAC authentication significant bits setting:

```
Matrix(rw)->clear macauthentication significant-bits
```

13.3.7.8 set macauthentication port

Use this command to enable or disable one or more ports for MAC authentication.

set macauthentication port {**enable** | **disable**} *port-string*

NOTE: Enabling port(s) for MAC authentication requires globally enabling MAC authentication on the device as described in Section 13.3.7.3, and then enabling it on a port-by-port basis. By default, MAC authentication is globally disabled and disabled on all ports.

Syntax Description

enable | **disable**	Enables or disables MAC authentication.
port-string	Specifies port(s) on which to enable or disable MAC authentication. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to enable MAC authentication on ge.2.1 though 5:

```
Matrix(rw)->set macauthentication port enable ge.2.1-5
```

13.3.7.9 set macauthentication authallocated

Use this command to set the number of MAC authentication sessions allowed for one or more ports.

set macauthentication authallocated *number port-string*

Syntax Description

number	Specifies the number of authentication sessions allowed.
port-string	Specifies port(s) on which to set the number of authentication sessions. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to set the number of allowed MAC authentication sessions to 4 on ge.2.1:

```
Matrix(rw)->set macauthentication authallocated 4 ge.2.1
```

13.3.7.10 clear macauthentication authallocated

Use this command to clear the number of MAC authentication sessions allowed for one or more ports.

clear macauthentication authallocated [*port-string*]

Syntax Description

port-string	(Optional) Clears the number of authentication sessions allowed for specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified the number of allowed authentication sessions will be cleared on all ports.

Example

This example shows how to clear the number of allowed MAC authentication sessions on ge.2.1:

```
Matrix(rw)->clear macauthentication authallocated ge.2.1
```

13.3.7.11 set macauthentication portinitialize

Use this command to force one or more MAC authentication ports to re-initialize and remove any currently active sessions on those ports.

set macauthentication portinitialize *port-string*

Syntax Description

port-string	Specifies the MAC authentication port(s) to re-initialize. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to force ge.2.1 through 5 to initialize:

```
Matrix(rw)->set macauthentication portinitialize ge.2.1-5
```

13.3.7.12 set macauthentication macinitialize

Use this command to force a current MAC authentication session to re-initialize and remove the session.

set macauthentication macinitialize *mac_addr*

Syntax Description

mac_addr	Specifies the MAC address of the session to re-initialize.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to force the MAC authentication session for address 00-60-97-b5-4c-07 to re-initialize:

```
Matrix(rw)->set macauthentication macinitialize 00-60-97-b5-4c-07
```

13.3.7.13 set macauthentication reauthentication

Use this command to enable or disable reauthentication of all currently authenticated MAC addresses on one or more ports.

set macauthentication reauthentication {**enable** | **disable**} *port-string*

Syntax Description

enable | **disable**	Enables or disables MAC reauthentication.
port-string	Specifies port(s) on which to enable or disable MAC reauthentication. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to enable MAC reauthentication on ge.4.1 though 5:

```
Matrix(rw)->set macauthentication reauthentication enable ge.4.1-5
```

13.3.7.14 set macauthentication portreauthenticate

Use this command to force an immediate reauthentication of the currently active sessions on one or more MAC authentication ports.

set macauthentication portreauthenticate *port-string*

Syntax Description

port-string	Specifies MAC authentication port(s) to be reauthenticated. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to force ge.2.1 though 5 to reauthenticate:

```
Matrix(rw)->set macauthentication portreauthentication ge.2.1-5
```

13.3.7.15 set macauthentication macreauthenticate

Use this command to force an immediate reauthentication of a MAC address.

set macauthentication macreauthenticate *mac_addr*

Syntax Description

mac_addr	Specifies the MAC address of the session to reauthenticate.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to force the MAC authentication session for address 00-60-97-b5-4c-07 to reauthenticate:

```
Matrix(rw)->set macauthentication macreauthenticate 00-60-97-b5-4c-07
```

13.3.7.16 set macauthentication reauthperiod

Use this command to set the MAC reauthentication period (in seconds). This is the time lapse between attempts to reauthenticate any current MAC address authenticated to a port.

set macauthentication reauthperiod *time port-string*

Syntax Description

time	Specifies the number of seconds between reauthentication attempts. Valid values are **1** - **4294967295**.
port-string	Specifies the port(s) on which to set the MAC reauthentication period. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to set the MAC reauthentication period to 7200 seconds (2 hours) on ge.2.1 through 5:

```
Matrix(rw)->set macauthentication reauthperiod 7200 ge.2.1-5
```

13.3.7.17 clear macauthentication reauthperiod

Use this command to clear the MAC reauthentication period on one or more ports.

clear macauthentication reauthperiod [*port-string*]

Syntax Description

port-string	(Optional) Clears the MAC reauthentication period on specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If port-string is not specified, the reauthentication period will be cleared on all ports.

Example

This example shows how to globally clear the MAC reauthentication period:

```
Matrix(rw)->clear macauthentication reauthperiod
```

13.3.7.18 set macauthentication quietperiod

Use this command to enable a reauthentication attempt for failed entries at the period specified in seconds. Default value is 0 (never).

set macauthentication quietperiod *time port-string*

Syntax Description

time	Specifies the number of seconds between reauthentication attempts. Valid values are **0 - 4294967295**.
port-string	Specifies the port(s) on which to set the macauthentication quiet period. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to set the macauthentication quiet period to 120 seconds (2 minutes) on ge.2.1 through 5:

```
Matrix(rw)->set macauthentication quiet period 120 ge.2.1-5
```

13.3.7.19 clear macauthentication quietperiod

Use this command to clear the macauthentication quiet period on one or more ports to the default value. The default value is 0 (never).

clear macauthentication quietperiod [*port-string*]

Syntax Description

port-string	(Optional) Clears the macauthentication quiet period on specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None

Example

This example shows how to clear the macauthentication quietperiod for port ge.1.1:

```
Matrix(rw)->clear macauthentication quietperiod ge.1.1
```

13.3.8 Configuring Convergence End Points (CEP) Phone Detection

About CEP Phone Detection

- Convergence is a method to detect a remote IP telephony or video device and apply a policy to the connection port based on the type of CEP device found. When a convergence end point (CEP) is found, the global policy for CEP detection is applied to the user on that port. The following phone detection types are available on Matrix DFE devices:
- Cisco Phone Detection – Uses the Cisco Discovery Protocol (CiscoDP) to detect IP phones. When using Cisco phone detection, CiscoDP must be enabled and configured properly as described in Section 2.2.10.
- Siemens or Hipath Phone Detection – Uses either an IP address or a UDP / TCP port number for detection. By default UDP port 4060 will be used and there is no IP address configured. The commands in this section can be used to configure Siemens detection using new parameters.
- H.323 Phone Detection – Uses either a UDP / TCP port number with multicast group IP address or a UDP / TCP port number for detection. Default UDP ports are 1718,1719,1720. Default group address is 224.0.1.41. The commands in this section can be used to configure H.323 detection using new parameters. A second default H.323 detection excludes the default group address.
- SIP Phone Detection – Uses either a UDP / TCP port number with multicast group IP address or a UDP / TCP port number for detection. Default UDP / TCP port is 5060 and a multicast IP of 224.0.1.75. A second default SIP detection excludes the default group address.

NOTE: There is no way to detect if a Siemens, SIP or H.323 phone goes away other than a link down. Therefore, if these types of phones are not directly connected to the switch's port and the phone goes away, the switch will still think there is a phone connection and any configured policy will remain on the port. Detected CEPs will be removed from the connection table if they do not send traffic for a period of time equal to the etsysMultiAuthIdleTimeout value. Additionally, CEPs will be removed if the total duration of their sessions exceeds the time specified by etsysMultiAuthSessionTimeout.

Purpose

To review, set the status and configure CEP phone detection.

Commands

Commands to configure CEP phone detection are listed below and described in the associated section as shown.

- show cep connections (Section 13.3.8.1)
- show cep detection (Section 13.3.8.2)
- show cep policy (Section 13.3.8.3)
- show cep port (Section 13.3.8.4)
- set cep (Section 13.3.8.5)
- set cep port (Section 13.3.8.6)
- set cep policy (Section 13.3.8.7)
- set cep detection (Section 13.3.8.8)
- set cep detection type (Section 13.3.8.9)
- set cep detection address (Section 13.3.8.10)
- set cep detection protocol (Section 13.3.8.11)
- set cep detection porthigh | portlow (Section 13.3.8.12)
- set cep initialize (Section 13.3.8.13)
- clear cep (Section 13.3.8.14)

13.3.8.1 show cep connections

Use this command to display all learned CEPs

show cep connections <*port-string*>

Syntax Description

port-string	Displays CEP status for one or more ports. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None

Command Mode

Read-Only.

Example

This example shows how to display CEP connections for port fe.1.21:

```
Matrix>show cep connections fe.1.21
Connection Info for fe.1.21
Endpoint Type      h323
Policy Index       3
Discovery Time     MON FEB 06 02:31:42 2006
Firmware Version
Address Type       unknown
Endpoint IP        unavailable
Endpoint MAC       00:04:0d:01:f8:35
```

13.3.8.2 show cep detection

Use this command to display CEP phone detection parameters.

show cep detection <*detection-id*>

Syntax Description

detection <*detection-id*>	Show all CEP detection parameters or show CEP detection parameters, based on the CEP configuration group id.

Command Defaults

None

Command Mode

Read-Only.

Examples

This example shows how to display CEP detection information:

```
Matrix>show cep detection
Global CEP state enabled
Detection Rules for Index 1:
Endpoint Phone Type h323
Protocol tcp & udp
Port Low 1718
Port High 1720
Address Type unknown
Address
Mask Type unknown
Mask
Row Status enabled
```

13.3.8.3 show cep policy

Use this command to display the global policies of all supported CEP types.

show cep policy

Syntax Description

Command Defaults

None

Command Mode

Read-Only.

Examples

This example shows how to display CEP policy information:

```
Matrix>show cep policy
CEP default policies
CEP Type  Policy Index  Policy Name
--------  ------------  ------------
cisco     13            Cisco IP Phone
siemens   9             IP Phone Siemens
h323      3             IP Phone Avaya
sip       0
```

13.3.8.4 show cep port

Use this command to display enable status of all supported CEP types.

show cep port <*port-string*>

Syntax Description

port <*port-string*>	Displays CEP status for one or more ports. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None

Command Mode

Read-Only.

Examples

This example shows how to display CEP status information for port fe.1.21:

```
Matrix>show cep port fe.1.21
Port          H323     Siemens    Cisco     SIP
----------  --------  --------  --------  --------
fe.1.21     enabled   enabled   enabled   disabled
```

13.3.8.5 set cep

Use this command to globally enable or disable CEP detection.

set cep {**enable** | **disable**}

Syntax Description

enable | **disable**	Globally enables or disables CEP detection.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to globally enable CEP detection:

```
Matrix>set cep enable
```

13.3.8.6 set cep port

Use this command to enable or disable a CEP detection type on one or more ports.

set cep port *port-string* {**cisco** | **h323** | **siemens** | **sip**} {**enable** | **disable**}

Syntax Description

port-string	Specifies the port(s) to enable or disable. For a detailed description of possible *port-string* values, refer to Section 3.1.1.
cisco	Set the Cisco detection status on the specified ports.
h323	Set the H323 detection status on the specified ports.
siemens	Set the Siemens detection status on the specified ports.
sip	Set the SIP detection status on the specified ports.
enable | **disable**	Enables or disables CEP detection as specified.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable Cisco phone detection on port fe. 3. 1:

```
Matrix>set cep port fe.3.1 cisco enable
```

13.3.8.7 set cep policy

Use this command to set a global default policy for a CEP detection type. This is the policy that will be applied when a phone of the specified type is detected on a port. It must be configured using the policy management commands described in Chapter 7.

set cep policy {**cisco** | **h323** | **siemens** | **sip**} *index*

Syntax Description

cisco	Set the Cisco global default policy index.
h323	Set the H323global default policy index.
siemens	Set the Siemens global default policy index.
sip	Set the SIP global default policy index.
index	Set the policy index value. This must be configured using the policy management commands described in Chapter 7. Valid values are **1 - 65535**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to assign policy index 1 to all H.323 phones detected:

```
Matrix>set cep policy h323 1
```

13.3.8.8 set cep detection-id

Use this command to create a new H.323, Siemens, or SIP phone detection configuration group, or enable, disable or remove an existing group.

set cep detection-id *id* {**create** | **delete** | **disable** | **enable**}

NOTE: This command applies only to Siemens, H.323, and SIP phone detection. Cisco detection uses CiscoDP as its discovery method.

Syntax Description

detection-id *id*	Specifies a CEP configuration group value. Valid values are **1 - 2147483647**.
create | **delete** | **disable** | **enable**	Creates a new convergence end points detection configuration group, or removes, disables or enables an existing group. A group must first be created then enabled to become operational.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create CEP detection group 1:

```
Matrix>set cep detection-id 1 create
```

13.3.8.9 set cep detection-id type

Use this command to specify whether a phone detection group will use H.323, Siemens or SIP as its phone discovery type.

set cep detection-id *id* **type** {**h323** | **siemens** | **sip**}

NOTE: This command applies only to Siemens, H.323, and SIP phone detection. Cisco detection uses CiscoDP as its discovery method.

NOTE: There are currently 3 manual detection types (Siemens, H323, SIP). Under manual detection configuration, for each of the types, the "Endpoint Phone Type" will be listed correctly, however the high and low ports will not reflect default ports for the "Endpoint Phone Types". The user will have to configure the port low and high options to match their needs for the Endpoint Phone Type being configured, as described in Section 13.3.8.12.

Syntax Description

detection-id *id*	Specifies a CEP configuration group ID. This group must be created and enabled using the **set cep detection-id** command as described in Section 13.3.8.8. Valid values are **1 - 2147483647**.
h323 | **siemens** | **sip**	Specifies the phone type to detect as H.323,Siemens or SIP.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the phone detection type to H.323 for CEP group 1:

```
Matrix>set cep detection-id 1 type h323
```

13.3.8.10 set cep detection-id address

Use this command to set an H.323, Siemens, or SIP phone detection group's IP address or mask. By default, H.323 will use 224.0.1.41 as its IP address and Siemens will have no IP address configured.

set cep detection-id *id* **address** { *ip-address* | **unknown** } **mask** {*mask*}| **unknown** }

NOTE: This command applies only to Siemens, H.323, and SIP phone detection. Cisco detection uses CiscoDP as its discovery method.

Syntax Description

detection-id *id*	Specifies a CEP configuration group ID. This group must be created and enabled using the **set cep detection-id** command as described in Section 13.3.8.8. Valid values are **1 - 2147483647**.
address *ip-address*	Sets the IP address for CEP detection.
unknown	Set the IP address of CEP detection to unknown
mask *mask*	Set the IP mask for CEP detection.
unknown	Set the mask for CEP detection to unknown.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set an IP address of 10.1.1.3 and mask for detection group 1:

```
Matrix>set cep detection-id 1 address 10.1.1.3 mask 255.255.0.0
```

13.3.8.11 set cep detection-id protocol

Use this command to specify an IP protocol type for H.323, Siemens, or SIP convergence end points detection. If an IP address is not set for a phone detection group as described in Section 13.3.8.10, this will configure detection on UDP and/or TCP ports using a port range defined with the **set cep detection-id porthigh** | **portlow** command as described in Section 13.3.8.12.

set cep detection-id *id* **protocol** {**tcp** | **udp** | **both** | **none**}

NOTE: This command applies only to Siemens, H.323, and SIP phone detection. Cisco detection uses CiscoDP as its discovery method.

Syntax Description

detection-id *id*	Specifies a CEP configuration group ID. This group must be created and enabled using the **set cep detection-id** command as described in Section 13.3.8.8. Valid values are **1 - 2147483647**.
tcp | **udp** | **both** | **none**	Sets the CEP IP protocol type to be used for detection as: • TCP • UDP • Both UDP and TCP • None

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable both TCP and UDP convergence end points detection for CEP detection group 1:

```
Matrix>set cep detection-id 1 protocol both
```

13.3.8.12 set cep detection-id porthigh | portlow

Use this command to set the maximum and minimum ports used for TCP or UDP convergence end points detection. Once UDP and/or TCP phone detection has been specified using the **set cep detection-id protocol** command as described in Section 13.3.8.11, the protocols will use this port range for detection matching.

set cep detection-id *id* { **porthigh** | **portlow** } *port*

NOTE: This command applies only to Siemens, H.323, and SIP phone detection. Cisco detection uses CiscoDP as its discovery method.

Syntax Description

detection-id *id*	Specifies a CEP configuration group ID. This group must be created and enabled using the **set cep detection-id** command as described in Section 13.3.8.8. Valid values are **1 - 2147483647**.
porthigh | **portlow** *port*	Specifies a maximum or minimum UDP or TCP port for CEP detection.Valid values are **1 - 65535**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set port 65 as the minimum port to be used for convergence end points detection for CEP group 1:

```
Matrix>set cep detection-id 1 portlow 65
```

13.3.8.13 set cep initialize

Use this command to clear all existing CEP connections for one or more CEP-enabled ports. This command is similar to the **clear cep users** command.

set cep initialize *port-string*

Syntax Description

port-string	Specifies the CEP-enabled port(s) to clear existing CEP connections. This must be a *port-string* enabled for CEP using the **set cep port** command as described in Section 13.3.8.6. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to re-initialize CEP ports fe.1.3-5:

```
Matrix>set cep initialize fe.1.3-5
```

13.3.8.14 clear cep

Use this command to clear convergence end points parameters.

clear cep {[**all** | **policy** | **detection** <detection-*id*> | **users** <*port-string*>] [**port** *port-string* {**all** | **cisco** | **h323** | **siemens** |**sip**}]}

Syntax Description

all	Restores factory defaults to all CEP configuration information.
policy	Restore factory defaults to CEP policy configuration.
detection <*detection-id*>	Restore factory defaults to CEP detection group configuration. *detection-id* is the CEP configuration group id. Valid values are **1 - 2147483647**.
users <*port-string*>	Clear discovered Convergence Endpoints on specific port(s). For a detailed description of possible *port-string* values, refer to Section 3.1.1.
port *port-string* **all** | **cisco** | **h323** | **siemens** | **sip**	Resets the CEP default enable state to disabled on specific port(s) for all detection types or individual detection types of Cisco, H.323, Siemens, or SIP phone detection. For a detailed description of possible *port-string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to clear all CEP policy parameters

```
Matrix>clear cep policy
```

This example shows how to clear detection id 4 parameters

```
Matrix>clear cep detection-id 4
```

This example shows how to clears ports fe.1.1-5 of Cisco phone detection parameters

```
Matrix>clear cep ports fe.1.1-5 cisco
```

13.3.9 Configuring MAC Locking

Purpose

To review, disable, enable and configure MAC locking. This locks a MAC address to one or more ports, preventing connection of unauthorized devices via the port(s). When source MAC addresses are received on specified ports, the switch discards all subsequent frames not containing the configured source addresses. The only frames forwarded on a “locked” port are those with the “locked” MAC address(es) for that port.

NOTE: Matrix DFE-Gold Series modules allow for up to 32 MAC addresses to be locked per port.

Commands

The commands needed to configure MAC locking are listed below and described in the associated section as shown:

- show maclock (Section 13.3.9.1)
- show maclock stations (Section 13.3.9.2)
- set maclock enable (Section 13.3.9.3)
- set maclock disable (Section 13.3.9.4)
- set maclock (Section 13.3.9.5)
- set maclock firstarrival (Section 13.3.9.6)
- set maclock move (Section 13.3.9.7)
- clear maclock firstarrival (Section 13.3.9.8)
- set maclock static (Section 13.3.9.9)
- clear maclock static (Section 13.3.9.10)
- set maclock trap (Section 13.3.9.11)
- clear maclock (Section 13.3.9.12)

13.3.9.1 show maclock

Use this command to display the status of MAC locking on one or more ports.

show maclock [*port_string*]

Syntax Description

port_string	(Optional) Displays MAC locking status for specified port(s). For a detailed description of possible *port_string* values, refer to Section 3.1.1.

Command Defaults

If *port_string* is not specified, MAC locking status will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display MAC locking information for ge.2.1 through 5:

```
Matrix(rw)->show maclock ge.2.1-5

MAC locking is globally enabled.

  Port      Port      Trap      Max Static  Max FirstArrival      Violating
 Number    Status    Status     Allocated     Allocated          MAC Address
--------  --------  --------  ----------  ----------------  -----------------
ge.2.1    enabled   enabled   20          600               00-00-00-00-00-00
ge.2.2    enabled   enabled   20          600               00-00-00-00-00-00
ge.2.3    enabled   enabled   20          600               00-00-00-00-00-00
ge.2.4    enabled   enabled   20          600               00-00-00-00-00-00
ge.2.5    enabled   enabled   20          600               00-00-00-00-00-00
```

Table 13-6 provides an explanation of the command output.

Table 13-6 show maclock Output Details

Output	What It Displays...
Port Number	Port designation. For a detailed description of possible *port_string* values, refer to Section 3.1.1.
Port Status	Whether MAC locking is **enabled** or **disabled** on the port. MAC locking is globally disabled by default. For details on using **set maclock** commands to enable it on the device and on one or more ports, refer to Section 13.3.9.3 and Section 13.3.9.5.
Trap Status	Whether MAC lock trap messaging is **enabled** or **disabled** on the port. For details on setting this status using the **set maclock trap** command, refer to Section 13.3.9.11.
Max Static Allocated	The maximum static MAC addresses allowed locked to the port. For details on setting this value using the **set maclock static** command, refer to Section 13.3.9.9.
Max FirstArrival Allocated	The maximum end station MAC addresses allowed locked to the port. For details on setting this value using the **set maclock firstarrival** command, refer to Section 13.3.9.6.
Violating MAC Address	Most recent MAC address(es) violating the maximum static and first arrival value(s) set for the port.

13.3.9.2 show maclock stations

Use this command to display MAC locking information about end stations connected to the device.

show maclock stations [**firstarrival** | **static**][*port-string*]

Syntax Description

firstarrival	(Optional) Displays MAC locking information about end stations first connected to MAC locked ports.
static	(Optional) Displays MAC locking information about static (management defined) end stations connected to MAC locked ports.
port_string	(Optional) Displays end station information for specified port(s). For a detailed description of possible *port_string* values, refer to Section 3.1.1.

Command Defaults

If no parameters are specified, MAC locking information will be displayed for all end stations.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display MAC locking information for the end stations connected to all Fast Ethernet ports in module 2:

```
Matrix(rw)->show maclock stations fe.2.*
Port Number   MAC Address         Status          State
-----------  -----------------   --------------  --------------
fe.2.3        00-10-a4-e5-08-4e   active          first learned
fe.2.3        08-00-20-7c-e0-db   active          first learned
fe.2.6        00-60-08-14-4b-15   active          first learned
fe.2.6        08-00-20-20-32-4b   active          first learned
fe.2.9        08-00-20-77-aa-80   active          first learned
fe.2.12       00-03-ba-08-4c-f0   active          first learned
fe.2.14       00-01-f4-2c-ad-b4   active          first learned
```

Table 13-7 provides an explanation of the command output.

Table 13-7 show maclock stations Output Details

Output	What It Displays...
Port Number	Port designation. For a detailed description of possible *port_string* values, refer to Section 3.1.1.
MAC address	MAC address of the end station(s) locked to the port.
Status	Whether the end stations are **active** or **inactive**.
State	Whether the end station locked to the port is a **first learned, first arrival** or **static** connection.

13.3.9.3 set maclock enable

Use this command to enable MAC locking on one or more ports. When enabled and configured for a specific MAC address and port string, this locks a port so that only designated end station addresses are allowed to participate in frame relay.

set maclock **enable** [*port_string*]

NOTE: MAC locking is disabled by default at device startup. Configuring one or more ports for MAC locking requires globally enabling it on the device and then enabling it on the desired ports as described in Section 13.3.9.5.

Syntax Description

port_string	(Optional) Enables MAC locking on specific port(s). For a detailed description of possible *port_string* values, refer to Section 3.1.1.

Command Defaults

If *port_string* is not specified, MAC locking will be enabled on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable MAC locking on fe.2.3:

```
Matrix(rw)->set maclock enable fe.2.3
```

13.3.9.4 set maclock disable

Use this command to disable MAC locking on one or more ports.

set maclock **disable** [*port_string*]

Syntax Description

port_string	(Optional) Disables MAC locking on specific port(s). For a detailed description of possible *port_string* values, refer to Section 3.1.1.

Command Defaults

If *port_string* is not specified, MAC locking will be disabled on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable MAC locking on fe.2.3:

```
Matrix(rw)->set maclock disable fe.2.3
```

13.3.9.5 set maclock

Use this command to create a static MAC address and enable or disable MAC locking for the specific MAC address and port. When created and enabled, this allows only the end station designated by the MAC address to participate in frame relay.

set maclock *mac_address port_string* {**create** | **enable** | **disable**}

NOTE: Configuring one or more ports for MAC locking requires globally enabling it on the device first using the **set maclock enable** command as described in Section 13.3.9.3.

Syntax Description

mac_address	Specifies the MAC address for which MAC locking will be created, enabled or disabled.
port_string	Specifies the port on which to create, enable or disable MAC locking. For a detailed description of possible *port_string* values, refer to Section 3.1.1.
create	Establishes a MAC locking association between the specified MAC address and port. Create automatically enables MAC locking between the specified MAC address and port.
enable | **disable**	Enables or disables MAC locking between the specified MAC address and port.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create a MAC locking association between MAC address 00-a0-c9-0d-32-11 and port fe.2.3:

```
Matrix(rw)->set maclock 00-a0-c9-0d-32-11 fe.2.3 create
```

13.3.9.6 set maclock firstarrival

Use this command to restrict MAC locking on a port to a maximum number of end station addresses first connected to that port.

set maclock firstarrival *port_string value*

Syntax Description

port_string	Specifies the port on which to limit MAC locking. For a detailed description of possible *port_string* values, refer to Section 3.1.1.
value	Specifies the number of first arrival end station MAC addresses to be allowed connections to the port. Valid values are **0** to **600**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to restrict MAC locking to 6 MAC addresses on fe.2.3:

```
Matrix(rw)->set maclock firstarrival fe.2.3 6
```

13.3.9.7 set maclock move

Use this command to move all current first arrival MACs to static entries.

set maclock move *port-string*

Syntax Description

port-string	Specifies the port where all current first arrival MACs will be moved to static entries. For a detailed description of possible *port_string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to move all current first arrival MACs to static entries on fe.1.3:

```
Matrix(rw)->set maclock move fe.1.3
```

13.3.9.8 clear maclock firstarrival

Use this command to reset the number of first arrival MAC addresses allowed per port to the default value of 600.

clear maclock firstarrival *port-string*

Syntax Description

port_string	Specifies the port on which to reset the first arrival value. For a detailed description of possible *port_string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset MAC first arrivals on fe.2.3:

```
Matrix(rw)->clear maclock firstarrival fe.2.3 6
```

13.3.9.9 set maclock static

Use this command to restrict MAC locking on a port to a maximum number of static (management defined) MAC addresses for end stations connected to that port.

set maclock static *port_string value*

Syntax Description

port_string	Specifies the port on which to limit MAC locking. For a detailed description of possible *port_string* values, refer to Section 3.1.1.
value	Specifies the number of static MAC addresses to be allowed connections to the port. Valid values are **0** to **20**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to restrict MAC locking to 4 static addresses on fe.2.3:

```
Matrix(rw)->set maclock static fe.2.3 4
```

13.3.9.10 clear maclock static

Use this command to reset the number of static MAC addresses allowed per port to the default value of 20.

clear maclock static *port_string*

Syntax Description

port_string	Specifies the port on which to reset the static MAC locking limit. For a detailed description of possible *port_string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset static MAC locking on fe.2.3:

```
Matrix(rw)->clear maclock static fe.2.3
```

13.3.9.11 set maclock trap

Use this command to enable or disable MAC lock trap messaging. When enabled, this authorizes the device to send an SNMP trap message if an end station is connected that exceeds the maximum values configured using the **set maclock firstarrival** and **set maclock static** commands. Violating MAC addresses are dropped from the device's routing table.

set maclock trap *port_string* {**enable** | **disable**}

Syntax Description

port_string	Specifies the port on which MAC lock trap messaging will be enabled or disabled. For a detailed description of possible *port_string* values, refer to Section 3.1.1.
enable | **disable**	Enables or disables MAC lock trap messaging.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable MAC lock trap messaging on fe.2.3:

```
Matrix(rw)->set maclock trap fe.2.3 enable
```

13.3.9.12 clear maclock

Use this command to clear MAC locking from one or more static MAC addresses.

clear maclock {**all** | *mac-address port-string*}

Syntax Description

all	Clears all static MAC locking for one or more ports.
mac_address	Specifies the MAC address for which the MAC locking will be cleared.
port_string	Specifies the port on which to clear MAC locking. For a detailed description of possible *port_string* values, refer to Section 3.1.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear MAC locking between MAC address 00-a0-c9-0d-32-11 and port fe.2.3:

```
Matrix(rw)->clear maclock 00-a0-c9-0d-32-11 fe.2.3
```

13.3.10 Configuring Multiple Authentication

About Multiple Authentication

When enabled, multiple authentication allows multiple users to authenticate using up to three methods on the same port, and receive a policy traffic profile based on the RADIUS configuration. When multi-authentication ports have a combination of authentication methods enabled, and a user is successfully authenticated in more than one way at the same time, the precedence of the authentication methods will determine which RADIUS-returned filter ID will be processed and result in an applied traffic policy profile.

Purpose

To configure multiple authentication.

Commands

The commands used to configure multiple authentication are listed below and described in the associated section as shown:

- set multiauth mode (Section 13.3.10.1)
- clear multiauth mode (Section 13.3.10.2)
- set multiauth precedence (Section 13.3.10.3)
- clear multiauth precedence (Section 13.3.10.4)
- show multiauth port (Section 13.3.10.5)
- set multiauth port (Section 13.3.10.6)
- clear multiauth port (Section 13.3.10.7)
- show multiauth station (Section 13.3.10.8)
- clear multiauth station (Section 13.3.10.9)
- show multiauth session (Section 13.3.10.10)
- show multiauth idle-timeout(Section 13.3.10.11)
- set multiauth idle-timeout(Section 13.3.10.12)
- clear multiauth idle-timeout(Section 13.3.10.13)
- show multiauth session-timeout(Section 13.3.10.14)

- set multiauth session-timeout(Section 13.3.10.15)
- clear multiauth session-timeout(Section 13.3.10.16)

13.3.10.1 set multiauth mode

Use this command to set the system authentication mode to use multiple authenticators simultaneously or to strictly adhere to 802.1X.

set multiauth mode {**multi** | **strict**}

Syntax Description

multi	Allows the system to use multiple authenticators simultaneously. **NOTE:** This mode requires that MAC, PWA, and 802.1X authentication be enabled globally, and configured appropriately on the desired ports per its corresponding command set as described in this chapter.
strict	Sets the system authentication mode to strict 802.1X.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to enable multiple authentication:

```
Matrix(rw)->set multiauth mode multi
```

13.3.10.2 clear multiauth mode

Use this command to clear the system authentication mode.

clear multiauth mode

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to clear the system authentication mode:

```
Matrix(rw)->clear multiauth mode
```

13.3.10.3 set multiauth precedence

Use this command to set the system's multiple authentication administrative precedence.When a user is successfully authenticated by more than one method at the same time, the precedence of the authentication methods will determine which RADIUS-returned filter ID will be processed and result in an applied traffic policy profile.

set multiauth precedence {[**dot1x**] [**mac**] [**pwa**]}

Syntax Description

dot1x	Sets precedence for 802.1X authentication.
mac	Sets precedence for MAC authentication.
pwa	Sets precedence for port web authentication.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to set precedence for MAC authentication:

```
Matrix(rw)->set multiauth precedence mac
```

13.3.10.4 clear multiauth precedence

Use this command to clear the system's multiple authentication administrative precedence.

clear multiauth precedence

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to clear the multiple authentication precedence:

```
Matrix(rw)->clear multiauth precedence
```

13.3.10.5 show multiauth port

Use this command to display multiple authentication properties for one or more ports.

show multiauth port [*port-string*]

Syntax Description

port-string	(Optional) Displays multiple authentication information for specific port(s).

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If *port-string* is not specified, multiple authentication information will be displayed for all ports.

Example

This example shows how to display multiple authentication information for ports fe.1.1-4:

```
Matrix(rw)->show multiauth port fe.1.1-4
Port         Mode           Max       Allowed    Current
                           users       users      users
------------ ------------- ---------- ---------- ----------
fe.1.1       auth-opt      128        128        0
fe.1.2       auth-opt      128        128        0
fe.1.3       auth-opt      128        128        0
fe.1.4       auth-opt      128        128        0
```

13.3.10.6 set multiauth port

Use this command to set multiple authentication properties for one or more ports.

set multiauth port mode {auth-opt | auth-reqd | force-auth | force-unauth} | numusers *numusers port-string*

Syntax Description

mode auth-opt | auth-reqd | force-auth | force-unauth	Specifies the port(s)' multiple authentication mode as: • **auth-opt** — Authentication optional • **auth-reqd** — Authentication required • **force-auth** — Authentication considered • **force-unauth** — Authentication disabled
numusers *numusers*	Specifies the number of users allowed authentication on port(s).
port-string	Specifies the port(s) on which to set multiple authentication properties.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to set the port multiple authentication mode to required on ge.3.14:

```
Matrix(rw)->set multiauth port mode auth-reqd ge.3.14
```

13.3.10.7 clear multiauth port

Use this command to clear multiple authentication properties for one or more ports.

clear multiauth port {[**mode**] [**numusers**] *port-string*}

Syntax Description

mode	Clears the port(s)' multiple authentication mode.
numusers	Clears the value set for the number of users allowed authentication on port(s).
port-string	Specifies the port(s) on which to clear multiple authentication properties.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Examples

This example shows how to clear the port multiple authentication mode on all 1-Gigabit Ethernet ports:

```
Matrix(rw)->clear multiauth port mode ge.*.*
```

13.3.10.8 show multiauth station

Use this command to display multiple authentication station (end user) entries.

show multiauth station [**mac** *address*] [**port** *port-string*]

Syntax Description

mac *address*	(Optional) Displays multiple authentication station entries for specific MAC address(es).
port *port-string*	(Optional) Displays multiple authentication station entries for specific port(s).

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no options are specified, multiple authentication station entries will be displayed for all MAC addresses and ports.

Example

This example shows how to display multiple authentication station entries. In this case, two end user MAC addresses are shown:

```
Matrix(rw)->show multiauth station

Port         Address type Address
------------ ------------ ------------------------
fe.1.20 mac          00-10-a4-9e-24-87
fe.2.16 mac          00-b0-d0-e5-0c-d0
```

13.3.10.9 clear multiauth station

Use this command to clear one or more multiple authentication station entries.

clear multiauth station [**mac** *address*] **port** *port-string*

Syntax Description

mac *address*	(Optional) Clears multiple authentication station entries for specific MAC address(es).
port *port-string*	Specifies the port(s) for which to clear multiple authentication station entries.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If not specified, multiple authentication station entries will be cleared for all MAC addresses.

Example

This example shows how to clear the multiple authentication station entry associated with port fe.1.20:

```
Matrix(rw)->clear multiauth station port fe.1.20
```

13.3.10.10 show multiauth session

Use this command to display multiple authentication session entries.

show multiauth session [**all**] [**agent** {**dot1x** | **mac** | **pwa** | **cep**}] [**mac** *address*] [**port** *port-string*]

Syntax Description

all	(Optional) Displays information about all sessions, including those with terminated status.
agent | **dot1x** | **mac** | **pwa** | **cep**	(Optional) Displays 802.1X, MAC, CEP, or port web authentication session information.
mac *address*	(Optional) Displays multiple authentication session entries for specific MAC address(es).
port *port-string*	(Optional) Displays multiple authentication session entries for specific port(s).

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no options are specified, multiple authentication session entries will be displayed for all sessions, authentication types, MAC addresses, and ports.

Example

This example shows how to display multiple authentication session:

```
Matrix(rw)->show multiauth session

Multiple authentication session entries
---------------------------------------
Port            : fe.2.2         Station address   : 00-01-f4-2b-4f-8b
Auth status     : success        Last attempt      : MON MAY 08 14:34:42 2006
Agent type      : pwa            Session applied   : true
Server type     : radius         VLAN-Tunnel-Attr  : None
Policy index    : 0              Policy name       : No policy applied
Session timeout : 43200          Session duration  : 0,00:01:01
Idle timeout    : 300            Idle time         : 0,00:00:00
Termination time: Not Terminated
```

13.3.10.11 show multiauth idle-timeout

Use this command to display the multiple authentication timeout value for an idle session. This will display the idle-timeout vlaues, in seconds, for the following authentication types: dot1x, pwa, mac, and cep.

show multiauth idle-timeout

Syntax Description

None

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

None

Example

This example shows how to display timeout values for an idle session, for each of the authentication types:

```
Matrix(rw)->show multiauth idle-timeout
Authentication type  Timeout (sec)
-------------------- -------------
dot1x                300
pwa                  300
mac                  300
cep                  300
```

13.3.10.12 set multiauth idle-timeout

Use this command to set the multiple authentication timeout value for an idle session. This command can set the idle-timeout vlaues, in seconds, for the following authentication types: dot1x, pwa, mac, and cep.

set multiauth idle-timeout [cep | dot1x | mac | pwa] <*timeout*>

Syntax Description

cep | dot1x | mac | pwa	Specifies the authentication type: • **cep** — Enterasys Convergence End Point Authentication • **dot1x**— IEEE 802.1X Port-Based Network Access Control • **mac** — Enterasys Mac Authentication • **pwa** — Enterasys Port Web Authentication
timeout	Number of seconds before session timeout. Range = 0-65535, if set to zero the session never times out.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

300 seconds for each of the multiple authentication types.

Examples

This example shows how to set the idle-timeout session for cep and mac authentication to 500 seconds:

```
Matrix(rw)->set multiauth idle-timeout cep 500
Matrix(rw)->set multiauth idle-timeout mac 500
```

This example shows how to set the idle-timeout session for all the authentication types to 600 seconds:

```
Matrix(rw)->set multiauth idle-timeout 600
```

13.3.10.13 clear multiauth idle-timeout

Use this command to clear multiple authentication idle-timeout values, for an idle session, back to the default values. This command can clear the idle-timeout values, in seconds, for the following authentication types: dot1x, pwa, mac, and cep.

clear multiauth idle-timeout [cep | dot1x | mac | pwa]

Syntax Description

cep | dot1x | mac | pwa	Specifies the authentication type: • **cep** — Enterasys Convergence End Point Authentication • **dot1x**— IEEE 802.1X Port-Based Network Access Control • **mac** — Enterasys Mac Authentication • **pwa** — Enterasys Port Web Authentication

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

300 seconds for each of the multiple authentication types.

Examples

This example shows how to clear the idle-timeout session values for cep and mac authentication types, back to default value of 300 seconds:

```
Matrix(rw)->clear multiauth idle-timeout cep
Matrix(rw)->clear multiauth idle-timeout mac
```

This example shows how to clear the idle-timeout session values for all authentication types, back to the default value of 300 seconds:

```
Matrix(rw)->set multiauth idle-timeout
```

13.3.10.14 show multiauth session-timeout

Use this command to display multiple authentication session-timeout values for an active session. This will display the session-timeout values, in seconds, for the following authentication types: dot1x, pwa, mac, and cep.

show multiauth session-timeout

Syntax Description

None

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

None

Example

This example shows how to display multiple authentication session-timeout values, for an active session:

```
Matrix(rw)->show multiauth session-timeout
Authentication type  Timeout (sec)
-------------------- -------------
dot1x                0
pwa                  0
mac                  0
cep                  0
```

13.3.10.15 set multiauth session-timeout

Use this command to set multiple authentication session-timeout values, for an active session. This command can set the session-timeout values, in seconds, for the following authentication types: dot1x, pwa, mac, and cep.

set multiauth session-timeout [cep | dot1x | mac | pwa] <*timeout*>

Syntax Description

cep | dot1x | mac | pwa	Specifies the authentication type: • **cep** — Enterasys Convergence End Point Authentication • **dot1x**— IEEE 802.1X Port-Based Network Access Control • **mac** — Enterasys Mac Authentication • **pwa** — Enterasys Port Web Authentication
timeout	Number of seconds before session timeout. Range = 0-65535, if set to zero the session never times out.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

300 seconds for each of the multiple authentication types.

Examples

This example shows how to set the session-timeout value for an active session, for cep and mac authentication to 500 seconds:

```
Matrix(rw)->set multiauth session-timeout cep 500
Matrix(rw)->set multiauth session-timeout mac 500
```

This example shows how to set the session-timeout value for an active session, for all the authentication types to 600 seconds:

```
Matrix(rw)->set multiauth session-timeout 600
```

13.3.10.16 clear multiauth session-timeout

Use this command to clear multiple authentication session-timeout values, for an active session, back to the default values. This command can clear the session-timeout values, in seconds, for the following authentication types: dot1x, pwa, mac, and cep.

clear multiauth session-timeout [**cep** | **dot1x** | **mac** | **pwa**]

Syntax Description

cep | dot1x | mac | pwa	Specifies authentication type: • **cep** — Enterasys Convergence End Point Authentication • **dot1x**— IEEE 802.1X Port-Based Network Access Control • **mac** — Enterasys Mac Authentication • **pwa** — Enterasys Port Web Authentication

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

300 seconds for each of the multiple authentication types.

Examples

This example shows how to clear the session-timeout values, for an active session, for cep and mac authentication types, to the default value of 0 seconds:

```
Matrix(rw)->clear multiauth idle-timeout cep
Matrix(rw)->clear multiauth idle-timeout mac
```

This example shows how to clear the session-timeout values, for an active session, for all authentication types, to the default value of 0 seconds:

```
Matrix(rw)->set multiauth idle-timeout
```

13.3.11 Configuring Secure Shell (SSH)

Purpose

To review, enable, disable, and configure the Secure Shell (SSH) protocol, which provides secure Telnet.

Commands

The commands used to review and configure SSH are listed below and described in the associated section as shown:

- show ssh state (Section 13.3.11.1)
- set ssh (Section 13.3.11.2)
- set ssh hostkey (Section 13.3.11.3)
- show router ssh (Section 13.3.11.4)
- set router ssh (Section 13.3.11.5)
- clear router ssh (Section 13.3.11.6)

13.3.11.1 show ssh state

Use this command to display the current status of SSH on the device.

show ssh state

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

None.

Examples

This example shows how to display SSH status on the device:

```
Matrix(rw)->show ssh state
 SSH Server status:   Disabled.
```

13.3.11.2 set ssh

Use this command to enable, disable or reinitialize SSH server on the device.

set ssh {**enable** | **disable** | **reinitialize**}

Syntax Description

enable | disable	Enables or disables SSH, or reinitializes the SSH server.
reinitialize	Reinitializes the SSH server.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to disable SSH:

```
Matrix(rw)->set ssh disable
```

13.3.11.3 set ssh hostkey

Use this command to set or reinitialize new SSH authentication keys.

set ssh hostkey [**reinitialize**]

Syntax Description

reinitialize	Reinitializes the server host authentication keys.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to regenerate SSH keys:

```
Matrix(rw)->set ssh hostkey reinitialize
```

13.3.11.4 show router ssh

Use this command to display the state of SSH service to the router.

show router ssh

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

None.

Example

This example shows how to display the state of SSH service to the router:

```
Matrix(rw)->show router ssh
SSH Server status: Enabled
```

13.3.11.5 set router ssh

Use this command to enables or disable SSH service to the router.

set router ssh {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disable SSH service.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to disable SSH service to the router:

```
Matrix(rw)->set router ssh disable
```

13.3.11.6 clear router ssh

Use this command to reset SSH service to the router to the default state of disabled.

clear router ssh

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to reset SSH service to the router to the default state of disabled:

```
Matrix(rw)->clear router ssh
```

13.3.12 Configuring Access Lists

ROUTER: These commands can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 2.3.3.

Purpose

To review and configure security access control lists (ACLs), which permit or deny access to routing interfaces based on protocol and source IP address restrictions.

Commands

The commands used to review and configure security access lists are listed below and described in the associated section as shown:

- show access-lists (Section 13.3.12.1)
- access-list (standard) (Section 13.3.12.4)
- access-list (extended) (Section 13.3.12.3)
- ip access-group (Section 13.3.12.4)

13.3.12.1 show access-lists

Use this command to display configured IP access lists when operating in router mode.

show access-lists [*number*]

Syntax Description

access-list-number	(Optional) Displays access list information for a specific access list number. Valid values are between **1** and **199**.

Command Type

Router command.

Command Mode

Any router mode.

Command Defaults

If *number* is not specified, the entire table of access lists will be displayed.

Example

This example shows how to display IP access list number 101. This is an extended access list, which permits or denies ICMP, UDP and IP frames based on restrictions configured with the one of the **access-list** commands. For details on configuring standard access lists, refer to Section 13.3.12.4. For details on configuring extended access lists, refer to Section 13.3.12.3.

```
Matrix>Router1#show access-lists 101
Extended IP access list 101
    permit icmp host 18.2.32.130 any
    permit udp host 198.92.32.130 host 171.68.225.126 eq
    deny ip 150.136.0.0 0.0.255.255 224.0.0.0 15.255.255.255
    deny ip 11.6.0.0 0.1.255.255 224.0.0.0 15.255.255.255 2)
    deny ip 172.24.24.0 0.0.1.255 224.0.0.0 15.255.255.255
```

13.3.12.2 access-list (standard)

Use this command to define a standard IP access list by number when operating in router mode. Restrictions defined by an access list are applied by using the **ip access-group** command (Section 13.3.12.4).

access-list *access-list-number* [**insert | replace** *entry*] | [**log** *1-5000* | *all*] [**move** *destination source1* [*source2*]] {**deny** | **permit}** *source* [*source-wildcard*]

To insert or replace an ACL entry:

access-list *access-list-number* **insert | replace** *entry*

To move entries within an ACL:

access-list *access-list-number* **move** *destination source1* [*source2*]

NOTE: Valid *access-list-numbers* for standard ACLs are **1** to **99**. For extended ACLs, valid values are **100** to **199**.

Syntax Description

access-list-number	Specifies a standard access list number. Valid values are from **1** to **99.**
insert | replace *entry*	(Optional) Inserts this new entry before a specified entry in an existing ACL, or replaces a specified entry with this new entry.
log *1-5000* | **all**	Enable syslog for ACL entry hits. Enable syslog for sequential number of ACL entry or for all ACL entries
move *destination source1 source2*	(Optional) Moves a sequence of access list entries before another entry. *Destination* is the number of the existing entry before which this new entry will be moved. *Source1* is a single entry number or the first entry number in the range to be moved. *Source2* (optional) is the last entry number in the range to be moved. If not specified, only the *source1* entry will be moved.
deny | permit	Denies or permits access if specified conditions are met.
protocol	Specifies an IP protocol for which to deny or permit access. Valid values and their corresponding protocols are: • **ip** - Any Internet protocol • **icmp** - Internet Control Message Protocol • **udp** - User Datagram Protocol • **tcp** - Transmission Protocol
source	Specifies the network or host from which the packet will be sent. Valid options for expressing source are: • IP address or range of addresses (A.B.C.D) • **any** - Any source host • **host** *source* - IP address of a single source host
source-wildcard	(Optional) Specifies the bits to ignore in the *source* address.

Command Syntax of the “no” Form

The “no” form of this command removes the defined access list or entry:

no access-list *access-list-number* [*entry*]

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

- If **insert, replace** or **move** are not specified, the new entry will be appended to the access list.
- If *source2* is not specified with **move**, only one entry will be moved.

Examples

This example shows how to allow access to only those hosts on the three specified networks. The wildcard bits apply to the host portions of the network addresses. Any host with a source address that does not match the access list statements will be rejected:

```
Matrix>Router1(config)#access-list 1 permit 192.5.34.0 0.0.0.255
Matrix>Router1(config)#access-list 1 permit 128.88.0.0 0.0.255.255
Matrix>Router1(config)#access-list 1 permit 36.0.0.0 0.255.255.255
```

This example moves entry 16 to the beginning of ACL 22:

```
Matrix>Router1(config)#access-list 22 move 1 16
```

13.3.12.3 access-list (extended)

*** Advanced License Required ***

Configuring extended access control lists (ACLs) is an advanced routing feature that must be enabled with a license key. If you have purchased an advanced routing license and have enabled routing on the device, you must activate your license as described in Section 12.2.1 in order to enable the extended access list command set. If you wish to purchase an advanced routing license, contact Enterasys Networks Sales.

Use this command to define an extended IP access list by number when operating in router mode. Restrictions defined by an access list are applied by using the **ip access-group** command as described in Section 13.3.12.4.

access-list *access-list-number* [**insert | replace** *entry*] | [**log** *1-5000* | **all**] [**move** *destination source1* [*source2*]] {**deny** | **permit}** *protocol source* [*source-wildcard*] [*operator* [*port*]] *destination* [*destination-wildcard*] [*operator* [*port*]] [*tos-extensions*][*icmp-type* [*icmp-code*] [**established**] [**log**]

To insert or replace an ACL entry:

access-list *access-list-number* **insert | replace** *entry*

To move entries within an ACL:

access-list *access-list-number* **move** *destination source1* [*source2*]

To log entries within an ACL:

access-list *access-list-number* **log** *1-5000* | **all**

To apply ACL restrictions to IP, UDP, TCP or ICMP packets:

access-list *access-list-number* {**deny** | **permit**} *protocol source* [*source-wildcard*] [*operator* [*port*]] *destination* [*destination-wildcard*] [*operator* [*port*]] [*tos-extensions*][*icmp-type* [*icmp-code*] [**established**] [**log**]

NOTE: Valid *access-list-numbers* for extended ACLs are **100** to **199**. For standard ACLs, valid values are **1** to **99**.

Syntax Description

access-list-number	Specifies an extended access list number. Valid values are from **100** to **199**.
insert | **replace** *entry*	(Optional) Inserts this new entry before a specified entry in an existing ACL, or replaces a specified entry with this new entry.
log *1-5000* | **all**	Enable syslog for ACL entry hits. Enable syslog for sequential numbers of ACL entries or for all ACL entries.
move *destination source1 source2*	(Optional) Moves a sequence of access list entries before another entry. *Destination* is the number of the existing entry before which this new entry will be moved. *Source1* is a single entry number or the first entry number in the range to be moved. *Source2* (optional) is the last entry number in the range to be moved. If not specified, only the *source1* entry will be moved.
deny | **permit**	Denies or permits access if specified conditions are met.
protocol	Specifies an IP protocol for which to deny or permit access. Valid values and their corresponding protocols are: • 0 – 255 - Any IP protocol number, as listed in http://www.iana.org/assignments/protocol-numbers • **ip** - Any Internet protocol • **icmp** - Internet Control Message Protocol • **udp** - User Datagram Protocol • **tcp** - Transmission Protocol • **ah** - Authentication Header Protocol • **esp** - Encapsulation Security Payload • **gre** - Generic Router Encapsulation Protocol
source	Specifies the network or host from which the packet will be sent. Valid options for expressing source are: • IP address or range of addresses (A.B.C.D) • **any** - Any source host • **host** *source* - IP address of a single source host
source-wildcard	(Optional) Specifies the bits to ignore in the *source* address.

destination	Specifies the network or host to which the packet will be sent. Valid options for expressing destination are: • IP address (A.B.C.D) • **any** - Any destination host • **host** *source* - IP address of a single destination host
destination-wildcard	(Optional) Specifies the bits to ignore in the *destination* address.
icmp-type	(Optional) Filters ICMP frames by ICMP message type. The type is a number from **0** to **255**.
icmp-code	(Optional) Further filters ICMP frames filtered by ICMP message type by their ICMP message code. The code is a number from **0** to **255**.
operator port	(Optional) Applies access rules to TCP or UDP source or destination port numbers. Possible operands include: • **lt** *port* - Match only packets with a lower port number. • **gt** *port* - Match only packets with a greater port number. • **eq** *port* - Match only packets on a given port number. • **neq** *port* - Match only packets not on a given port number. • **range** *min-sport max-sport* - Match only packets in the range of source ports • **range** *min-dport max-dport* - Match only packets in the range of destination ports.
tos-extensions	(Optional) Applies access rules to the precedence and/or tos fields, or to the DiffServ field. That is, you can specify one or both precedence and tos fields, or you can specify the DiffServ field. Use the following keyword/value pairs to specify the tos-extensions: • **precedence** *value (0-7)* - Match packets based on the IP precedence value. • **tos** *value (0-15)* - Match packets based on the IP Type of Service value. • **dscp** *value (0-63)* - Match packets based on the Diffserv codepoint value.

established	(Optional) Applies TCP restrictions to established connections only.
log	(Optional) Enable the rule being configured for syslog.

Command Syntax of the "no" Form

The "no" form of this command removes the defined access list or entry:

no access-list *access-list-number* [*entry*]

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

- If **insert**, **replace**, or **move** are not specified, the new entry will be appended to the access list.
- If *source2* is not specified with **move**, only one entry will be moved.
- If *icmp-type* and *icmp-code* are not specified, ICMP parameters will be applied to all ICMP message types.
- If *operator* and *port* are not specified, access parameters will be applied to all TCP or UDP ports.

Examples

This example shows how to define access list 101 to deny ICMP transmissions from any source and for any destination:

```
Matrix>Router1(config)#access-list 101 deny ICMP any any
```

This example shows how to define access list 102 to deny TCP packets transmitted from IP source 10.1.2.1 with a port number of 42 to any destination.

```
Matrix>Router1(config)#access-list 102 deny TCP host 10.1.2.1 eq 42 any
```

This example shows how to define access list 101 to deny TCP packets transmitted from any IP source port with the precedence field set to a value of 3 and the tos field set to a value of 4.

```
Matrix>Router1(config)#access-list 101 deny tcp any precedence 3 tos 4
```

This example shows how to define access list 102 to deny TCP packets transmitted from any IP source port with a the DiffServ value set to 55.

```
Matrix>Router1(config)#access-list 102 deny tcp any any dscp 55
```

13.3.12.4 ip access-group

Use this command to apply access restrictions to inbound or outbound frames on an interface when operating in router mode.

ip access-group *access-list-number* {**in** | **out**}

NOTE: ACLs must be applied per routing interface. An entry (rule) can either be applied to inbound or outbound frames.

Syntax Description

access-list-number	Specifies the number of the access list to be applied to the access list. This is a decimal number from **1** to **199**.
in	Filters inbound frames.
out	Filters outbound frames.

Command Syntax of the "no" Form

The "no" form of this command removes the specified access list:

no ip access-group *access-list-number* {**in** | **out**}

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to apply access list 1 for all inbound frames on VLAN 1. Through the definition of access list 1, only frames with destination 192.5.34.0 will be routed. All the frames with other destination received on VLAN 1 are dropped:

```
Matrix>Router1(config)#access-list 1 permit 192.5.34.0 0.0.0.255
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip access-group 1 in
```

13.3.13 Configuring Policy-Based Routing

ROUTER: These commands can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 2.3.3.

About Policy-Based Routing

Normally, IP packets are forwarded according to the route that has been selected by traditional routing protocols, such as RIP and OSPF, or by static routes. In this case, selection is performed based only on the destination of the IP packet. Policy-based routing adds more flexibility to routing by specifying other alternative paths. When a route map list is configured and applied to an interface, policy-based routing will check an incoming IP packet against the access list (ACL) of each map of that list in sequence. If no ACL permit rule matches the packet, the packet is forwarded on the normal routing path using a route lookup. If a permit rule does match, the ACL check is exited and the map having the ACL matching the packet is checked for further routing instruction. If the action of that map is permit, and a next hop is specified, policy-based routing will forward the packet to the next hop specified in that map. Otherwise it will forward the packet on the normal routing path using a route lookup. One route map list is allowed per routing interface.

Purpose

To review and configure route maps and policy-based routing.

Commands

The commands used to review and configure policy-based routing are listed below and described in the associated section as shown:

- show route-map (Section 13.3.13.1)
- route-map (Section 13.3.13.2)
- match ip address (Section 13.3.13.3)
- set next hop (Section 13.3.13.4)
- show ip policy (Section 13.3.13.5)
- ip policy route-map (Section 13.3.13.6)
- ip policy priority (Section 13.3.13.7)
- ip policy load-policy (Section 13.3.13.8)

- ip policy pinger (Section 13.3.13.9)

13.3.13.1 show route-map

Use this command to display a configured route map list for policy-based routing.

show route-map *id-number*

Syntax Description

id-number	Specifies the ID number for which to display a configured PBR route map list. Valid values for PBR are **100 - 199**.

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to display route map list 101. In this case, the packet source IP addresses matching ACL lists 2,3,4,8, or 110 will be forwarded to next hop 10.2.1.1, 10.2.2.1 or 10.2.3.1. The route map list was created using the **route-map** command (Section 13.3.13.2). The packet source IP address was then matched to an ACL using the **match ip address** command (Section 13.3.13.3), and the packet's next hops were defined using the **set next-hop** command (Section 13.3.13.4):

```
Matrix>Router1#show route map 101
route-map 101, permit, sequence 1
 Match clauses:
  ip address 2 3 4 8 110
Set clauses:
  next-hop 10.2.1.1 10.2.2.1 10.2.3.1
 Policy matches: 0 packets
```

13.3.13.2 route-map

Use this command to create a route map for policy-based routing and to enable policy-based routing configuration mode.

route-map *id-number* [**permit** | **deny**] [*sequence-number*]

NOTE: Use this command to add a route map to an existing route map list by specifying the list's *id-number* and a new *sequence-number*.

Syntax Description

id-number	Specifies a route map list ID number to which this route map will be added. If an unused ID number is specified, a new route map list will be created. Valid values are for policy-based routing are: **100** - **199**.
permit	(Optional) Permits the packet to bypass route lookup and be forwarded to the next hop configured in the matching route map.
deny	(Optional) Denies policy-based routing, forcing the packet to continue on its normal routing path.
sequence-number	(Optional) Specifies the order of this map in the route map list, and the order in which this route map will be checked for matching access list criteria. The packet check will exit with the first map in the list which matches the packet data.

Command Syntax of the "no" Form

The "no" form of this command removes the specified route map list:

no route-map *id-number*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

- If **permit** or **deny** is not specified, this command will enable route map or policy based routing configuration mode.
- If *sequence-number* is not specified, **10** will be applied.

Example

This example shows how to create route map 101 with a sequence order of 20:

```
Matrix>Router1(config)#route-map 101 permit 20
```

13.3.13.3 match ip address

Use this command to match a packet source IP address against a PBR access list. Up to 5 access lists can be matched.

match ip address *access-list-number*

Syntax Description

ip address	Matches packet source IP addresses to the specified access list.
access-list-number	Specifies an access list to match to the packet source IP address. Valid values are **1 - 199**.

Command Syntax of the "no" Form

The "no" form of this command removes the match between an access list and this route map:

no match ip address *access-list-number*

Command Type

Router command.

Command Modes

Policy-based routing configuration: **Matrix>Router1(config-route-map-pbr)#**

Command Defaults

None.

Example

This example shows how to match a packet source IP address to access list 1:

```
Matrix>Router1(config)#route-map 101
Matrix>Router1(config-route-map-pbr)#match ip address 1
```

13.3.13.4 set next hop

Use this command to set one or more next hop IP address for packets matching an extended access list in a configured route map. Up to five next hops can be specified.

set next hop {*next-hop1*}[*next-hop2....next-hop5*]

Syntax Description

next-hop	Specifies a next hop IP address(es). Up to five can be configured.

Command Syntax of the "no" Form

The "no" form of this command deletes next hop IP address(es):

no set next hop {*next-hop1*}[*next-hop2....next-hop5*]

Command Type

Router command.

Command Mode

Policy-based routing configuration: **Matrix>Router1(config-route-map-pbr)#**

Command Defaults

None.

Example

This example shows how to set IP address 10.2.3.4 as the next hop for packets matching ACL 1:

```
Matrix>Router1(config)#route-map 101 permit 20
Matrix>Router1(config-route-map-pbr)#match ip address 1
Matrix>Router1(config-route-map-pbr)#set next-hop 10.2.3.4
```

13.3.13.5 show ip policy

Use this command to display the policy applied to a routing interface.

show ip policy

Syntax Description

None.

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to display policy information:

```
Matrix>Router1(config)#show ip policy
Interface  Route map  Priority  Load policy        Pinger  Interval Retries
3          103        first     first-available    off     3        3
2          102        only      round-robin        on      10       4
```

Table 13-8 provides an explanation of the command output.

Table 13-8 show ip policy Output Details

Output	What It Displays...
Interface	Routing interface.
Route map	Route map assigned to the routing interface (using the **ip policy route-map** command as described in Section 13.3.13.6.)
Priority	How the PBR next hop selection will be prioritized. Set with the **ip policy priority** command as described in Section 13.3.13.7.
Load policy	How the PBR next hop will be selected. Set with the **ip policy load-policy** command as described in Section 13.3.13.7.

Table 13-8 show ip policy Output Details (Continued)

Output	What It Displays...
Pinger	Whether PBR next hop pinging is on or off. Can be turned on and configured using the **ip policy pinger** command as described in Section 13.3.13.9.
Interval	PBR next hop ping interval (in seconds). Default of 3 can be reset using the **ip policy pinger** command as described in Section 13.3.13.9.
Retries	Number of PBR next hop ping retries. Default of 3 can be reset using the **ip policy pinger** command as described in Section 13.3.13.9.

13.3.13.6 ip policy route-map

Use this command to assign a route map list to a routing interface**.**

ip policy route-map *id-number*

Syntax Description

id-number	Specifies a route map ID number. Valid values are **100** - **199**, and must match a value previously set using the **route-map** command (Section 13.3.13.2). **NOTE:** Only one route map list is allowed per interface.

Command Syntax of the "no" Form

The "no" form of un-assigns a route map list:

no ip policy route-map

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to assign route map 101 to VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip policy route-map 101
```

13.3.13.7 ip policy priority

Use this command to prioritize PBR next hop behavior.

ip policy priority {[**only**] [**first**] [**last**]}

Syntax Description

only | **first** | **last**	Prioritizes use of the PBR configured policy — as opposed to doing a lookup in the FIB (Forward Information Base) route table for a next hop — as follows: • **only** - uses the PBR next hop, but if it is unavailable, drops the packet. • **first** (default) - uses the PBR next hop, but if unavailable, falls back to the FIB. • **last** - uses the FIB, but if no route is found, then uses the PBR next hop.

Command Syntax of the "no" Form

The "no" form of this command resets the PBR priority configuration back to the default of **first:**

no ip policy priority

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the IP policy priority on VLAN 1 to "last":

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip policy priority last
```

13.3.13.8 ip policy load-policy

Use this command to configure PBR next hop behavior. When more than one next hop is configured (using the **set next hop** command as described in Section 13.3.13.4) the load policy specifies choosing one next hop from among the sequence of next hops in the map matching the current packet. A next hop is considered available by default unless a pinger task is running and has flagged it as unavailable.

ip policy load-policy {[**first-available**] [**round-robin**] [**ip-hash** {**sip** | **dip** | **both**}]}

Syntax Description

first-available | **round-robin** | **ip-hash sip** | **dip** | **both**	Specifies next hop selection behavior as: • **first-available** (default) - uses the first available next hop from the list of next hops • **round-robin -** circulates among the available next hops in the list. • **ip-hash sip** | **dip** | **both** - chooses a next hop based on a XOR hash of the IP source address, the IP destination address, or both.

Command Syntax of the "no" Form

The "no" form of this command resets the next hop behavior to **first-available**:

no ip policy load-policy

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan <vlan_id>))#**

Command Defaults

If **pinger** is not specified, none is configured.

Example

This example shows how to set the load policy behavior on VLAN 1 to "round-robin":

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip policy load-policy round-robin
```

13.3.13.9 ip policy pinger

Use this command to configure behavior for pinging PBR next hops.

ip policy pinger {**off** | **on** [**interva**l *interval*] [**retries** *retries*}

Syntax Description

off	Turns ping off so all next hops are available by default.
on	Starts pinging all next-hops in the route map list.
interval *interval*	(Optional) When ping is on, specifies the ping interval in seconds. Valid values are 1 - 30. Default is 3.
retries *retries*	(Optional) When ping is on, specifies the number of retries (timeout failures) before setting the hop as unavailable. Valid values are 1 - 10. Default is 3.

Command Syntax of the “no” Form

The “no” form of this command turns PBR ping to off:

no ip policy pinger

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan <vlan_id>))#**

Command Defaults

- If not specified, **interval** will be set to 3 seconds.
- If not specified, **retries** will be set to 3.

Example

This example shows how to configure the PBR ping interval to 5 and retries to 4 on VLAN 1:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#ip policy pinger on interval 5 retries 4
```

13.3.14 Configuring Denial of Service (DoS) Prevention

ROUTER: These commands can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 2.3.3.

Purpose

To configure Denial of Service (DoS) prevention, which will protect the router from attacks and notify administrators via Syslog.

Commands

The commands used to configure DoS prevention are listed below and described in the associated section as shown:

- show hostdos (Section 13.3.14.1)
- hostdos (Section 13.3.14.2)
- clear hostdos-counters (Section 13.3.14.3)

13.3.14.1 show hostdos

Use this command to display Denial of Service security status and counters.

show hostdos

NOTE: When fragmented ICMP packets protection is enabled, the Ping of Death counter will not be incremented. Ping of Death is a subset of the fragmented ICMP function.

Syntax Description

None,

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to display Denial of Service security status and counters. For details on how to set these parameters, refer to Section 13.3.14.2:

```
Matrix>Router1(config)#show hostdos
LANDd Attack (Destination IP = Source IP)
   Disabled
Spoofed Address Check
   Disabled
IP packet with multicast/broadcast source address
   Always enabled
   0 attacks
Fragmented ICMP traffic
   Disabled
Large ICMP packet
   Disabled
Ping-of-Death attack
   Always enabled
   0 attacks
Port Scanning
   Disabled
```

13.3.14.2 hostdos

Use this command to enable or disable Denial of Service security features.

hostdos {**land** | **fragmicmp** | **largeicmp** *size* | **checkspoof** | **portscan**}

Syntax Description

land	Enables land attack protection and automatically discards illegal frames. This can be enabled globally, or per-interface.
fragmicmp	Enables fragmented ICMP and Ping of Death packets protection and automatically discards illegal frames. This can only be enabled globally.
largeicmp *size*	Enables large ICMP packets protection, specifies the packet size above which the protection starts, and automatically discards illegal frames. Valid packet size values are 1 to 65535. The default is 1024. This can only be enabled globally.
checkspoof	Enables spoofed address checking and automatically reports spoofed addresses via Syslog. This can be enabled globally, or per-interface.
portscan	Enables UDP and TCP port scan protection. This can only be enabled globally.

Command Syntax of the "no" Form

The "no" form of this command disables the specified security features:

no hostdos {**land** | **fragmicmp** | **largeicmp** *size* | **checkspoof**}

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**, or
Interface configuration: **Matrix>Router1(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Examples

This example shows how to globally enable land attack and large ICMP packets protection for packets larger than 2000 bytes:

```
Matrix>Router1(config)#hostdos land
Matrix>Router1(config)#hostdos largeicmp 2000
```

This example shows how to enable spoofed address checking on the VLAN 1 interface:

```
Matrix>Router1(config)#interface vlan 1
Matrix>Router1(config-if(Vlan 1))#hostdos checkspoof
```

13.3.14.3 clear hostdos-counters

Use this command to clear Denial of Service security counters.

clear hostdos-counters

Syntax Description

None.

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

None.

Example

This example shows how to clear Denial of Service security counters:

```
Matrix>Router(config)#clear hostdos-counters
```

13.3.15 Configuring Flow Setup Throttling (FST)

About FST

Flow Setup Throttling (FST) is a proactive feature designed to mitigate DoS attacks before the virus can wreak havoc on the network. FST directly combats the effects of DoS attacks by limiting the number of new or established flows that can be programmed on any individual switch port. This is achieved by monitoring the new flow arrival rate and/or controlling the maximum number of allowable flows.

FST limits the vulnerability of connection attacks on the network by allowing administrators to:

- Globally enable FST on the switch and on a port-by-port basis.
- Configure the maximum flows allowed per user classification (port type) and the actions that will occur when flow limits are reached.
- Assign a user classification to each interface.
- Control the generation of SNMP notifications.
- Control the time (in seconds) to wait before generating another notification of the same type on the same interface.
- Control link status.

Purpose

To review and configure Flow Setup Throttling.

Commands

The commands needed to configure Flow Setup Throttling are listed below and described in the associated section as shown:

- show flowlimit (Section 13.3.15.1)
- set flowlimit (Section 13.3.15.2)
- set flowlimit limit (Section 13.3.15.3)
- clear flowlimit limit (Section 13.3.15.4)
- set flowlimit action (Section 13.3.15.5)
- clear flowlimit action (Section 13.3.15.6)
- show flowlimit class (Section 13.3.15.7)

- set flowlimit port (Section 13.3.15.8)
- clear flowlimit port class (Section 13.3.15.9)
- set flowlimit shutdown (Section 13.3.15.10)
- set flowlimit notification (Section 13.3.15.11)
- clear flowlimit notification interval (Section 13.3.15.12)
- clear flowlimit stats (Section 13.3.15.13)

13.3.15.1 show flowlimit

Use this command to display flow setup throttling information.

show flowlimit [**port** [*port-string*]] [**stats** [*port-string*]]

Syntax Description

port *port-string*	(Optional) Displays flow limiting port settings for one or all ports.
stats *port-string*	(Optional) Displays flow limiting statistics for one or all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no optional parameters are specified, detailed flow limiting information will be displayed for all ports.

Example

This example shows how to display flow limiting information for Fast Ethernet port 1 in module 2. In this case, it is enabled for FST with an "unspecified" port classification, is currently operational, and has no FST action assigned:

```
Matrix(rw)->show flowlimit limit port fe.2.1
Flow setup throttling port configuration:

Port      Class              State    Status                Reason     Layer
--------- ------------------ -------- --------------------- ---------- -----
fe.2.1    unspecified        enabled  operational           noAction   L4
```

13.3.15.2 set flowlimit

Use this command to globally enable or disable flow setup throttling.

set flowlimit {**enable** | **disable**}

Syntax Description

enable | disable	Globally enables or disables FST.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to enable FST on Fast Ethernet ports 1-5 in module 2:

```
Matrix(rw)->set flowlimit fe.2.1-5 enable
```

13.3.15.3 set flowlimit limit

Use this command to set a flow limit that will trigger an action for a port user classification. Once configured, this limit can be:

- associated with an action using the **set flowlimit action** command as described in Section 13.3.15.5.
- assigned to one or more ports using the **set flowlimit class** command as described in Section 13.3.15.8.

set flowlimit {**limit1** | **limit2** *limit*} [**userport** | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**]

Syntax Description

limit1 | **limit2**	Specifies this configuration as limit 1 or 2. Two limits assigned to two actions (describing what will occur when a certain flow limit is reached) can be defined per user classification.
limit	Specifies the number of flows that will trigger the associated action configuration. Valid values are **0** - **4294967295**.
userport | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**	(Optional) Assigns this limit configuration to the user classification port type: • user port • server port • aggregation port • inter-switch link • unspecified port

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If classification port type is not specified, none will be applied.

Example

This example shows how to set the flow limit 1 to 12 flows on ports classified as user ports:

```
Matrix(rw)->set flowlimit limit1 12 userport
```

13.3.15.4 clear flowlimit limit

Use this command to remove a flow limit configuration.

clear flowlimit {**limit1** | **limit2**} [**userport** | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**]

Syntax Description

limit1 | **limit2**	Specifies the configuration to be removed as limit 1 or 2.
userport | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**	(Optional) Removes this limit configuration from the user classification port type: • user port • server port • aggregation port • inter-switch link • unspecified port

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If not specified, the limit will be removed from all port classification types.

Example

This example shows how to remove flow limit 1 from all port classifications:

```
Matrix(rw)->clear flowlimit limit1
```

13.3.15.5 set flowlimit action

Use this command to associate an action with a flow limit. This is the action that will occur once the associated flow limit is reached.

set flowlimit {**action1** | **action2**} [**notify**] [**drop**] [**disable**] [**userport** | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**]

Syntax Description

action1 | **action2**	Specifies this configuration as action 1 or 2. Two actions describing what will occur when a certain flow limit is reached can be defined per user classification. Action number must correspond to a flow limit configured using the **set flowlimit limit** command as described in Section 13.3.15.3.
notify	(Optional) When flow limit is reached, generates an SNMP trap notification (if the **set flowlimit notification** function is enabled as described in Section 13.3.15.11).
drop	(Optional) When flow limit is reached, drops excess flows and discard packets.
disable	(Optional) When flow limit is reached, disables the interface (if the **set flowlimit shutdown** function is enabled as described in Section 13.3.15.10). This will clear all FST settings on the port.
userport | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**	(Optional) Assigns this action configuration to the user classification port type: • user port • server port • aggregation port • inter-switch link • unspecified port

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

- If action is not specified, no action will be applied.
- If classification port type is not specified, none will be applied.

Example

This example shows how to set flow limiting action 1 to discard all flows exceeding flow limit 1 on ports classified as user ports:

```
Matrix(rw)->set flowlimit action 1 discard userport
```

13.3.15.6 clear flowlimit action

Use this command to remove a flow limiting action configuration.

clear flowlimit {**action1** | **action2**} [**notify**] [**drop**] [**disable**] [**userport** | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**]

Syntax Description

action1 | **action2**	Specifies the configuration to be removed as action 1 or 2.
notify	(Optional) Removes the notify action.
drop	(Optional) Removes the drop action.
disable	(Optional) Removes the disable action.
userport | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**	(Optional) Removes this action configuration from the user classification port type: • user port • server port • aggregation port • inter-switch link • unspecified port

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

- If not specified, all action types will be removed.
- If not specified, the action will be removed from all port classifications.

Example

This example shows how to remove flow limiting action 1 from all port classifications:

```
Matrix(rw)->clear flowlimit action1
```

13.3.15.7 show flowlimit class

Use this command to display flow limiting classification configuration(s).

show flowlimit class [**userport** | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**]

Syntax Description

userport | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**	(Optional) Displays flow limiting information related to the following classification: • user port • server port • aggregation port • interswitch link • unspecified port

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If port classification type is not specified, information related to all classifications will be displayed.

Example

This example shows how to show flow limits and associated actions configured for the various port classifications:

```
Matrix(rw)->show flowlimit class
Flow setup throttling class configuration:

Class              Limit                  Action
------------------ ---------------------- ---------------------------
userPort           limit1     :800        action1    :notify
                   limit2     :1000       action2    :disable,notify

serverPort         limit1     :5000       action1    :notify
                   limit2     :6000       action2    :disable,notify

aggregatedUserPort limit1     :5000       action1    :notify
                   limit2     :6000       action2    :disable,notify

interSwitchLink    limit1     :14000      action1    :notify
                   limit2     :16000      action2    :disable,notify

unspecified        limit1     :0          action1    :notify
                   limit2     :0          action2    :disable,notify
```

13.3.15.8 set flowlimit port

Use this command to:

- enable or disable flow limiting on one or more port(s),
- assign a flow limiting user classification to one or more port(s). Once a classification is assigned, these ports will be subject to the flow limit configured (with the **set flowlimit limit** command as described in Section 13.3.15.3) and the action configured (with the **set flowlimit action** command as described in Section 13.3.15.5).
- Enable an interface previously disabled by a flow limiting action.

set flowlimit port {**enable** | **disable**} | **class** {**userport** | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**} | **status** {**operational**} [*port-string*]

Syntax Description

enable | **disable**	Enables or disables flow limiting on specified ports.
class userport | **serverport** | **aggregateduser** | **interswitchlink** | **unspecified**	Assigns a user classification type to the port(s) as: • user port • server port • aggregation port • interswitch link • unspecified port
status operational	Enables an interface previously disabled by a flow limiting action.
port-string	(Optional) Specifies port(s) on which to configure flow limiting parameters.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified, settings will apply to all ports.

Example

This example shows how to assign the user port classification type to Fast Ethernet ports 3-5 in module 2:

```
Matrix(rw)->set flowlimit port class userport fe.2.3-5
```

13.3.15.9 clear flowlimit port class

Use this command to remove flow limiting port classification properties.

clear flowlimit port class [*port-string*]

Syntax Description

port-string	(Optional) Specifies port(s) on which to remove flow limiting classification properties.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified, classifications will be removed from all ports.

Example

This example shows how to clear port classifications from all Gigabit Ethernet ports:

```
Matrix(rw)->clear flowlimit port class ge.*.*
```

13.3.15.10 set flowlimit shutdown

Use this command to enable or disable the flow limit shut down function. When enabled, this allows ports configured with a "disable" action to shut down. For information on using the **set flowlimit limit** command to configure set a disable action on a port, refer to Section 13.3.15.3.

set flowlimit shutdown {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables the flow limit shut down function.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to enable the flow limit shut down function:

```
Matrix(rw)->set flowlimit shutdown enable
```

13.3.15.11 set flowlimit notification

Use this command to enable or disable flow limit notification, or to set a notification interval. When enabled, this allows ports configured with a "trap" action to send an SNMP trap message when a specified flow limit is reached. For information on using the **set flowlimit limit** command to configure a trap action on a port, refer to Section 13.3.15.3.

set flowlimit notification {**disable** | **enable** | *interval*}

Syntax Description

disable | **enable**	Disables or enables SNMP notification.
interval	Specifies a notification interval (in seconds) for SNMP trap messages. Valid values are **0 - 4294967295**.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to enable the flow limit notification function:

```
Matrix(rw)->set flowlimit notification enable
```

13.3.15.12 clear flowlimit notification interval

Use this command to reset the SNMP flow limit notification interval to the default value of 120 seconds.

clear flowlimit notification interval

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to reset the SNMP flow limit notification interval:

```
Matrix(rw)->clear flowlimit notification interval
```

13.3.15.13 clear flowlimit stats

Use this command to reset flow limiting statistics back to default values on one or more port(s).

clear flowlimit stats [*port-string*]

Syntax Description

port-string	(Optional) Resets flow limiting statistics on specific port(s).

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified, statistics will be reset on all ports.

Example

This example shows how to reset flow limiting statistics back to default values on Fast Ethernet port 5 in module 1:

```
Matrix(rw)->clear flowlimit stats fe.1.5
```

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